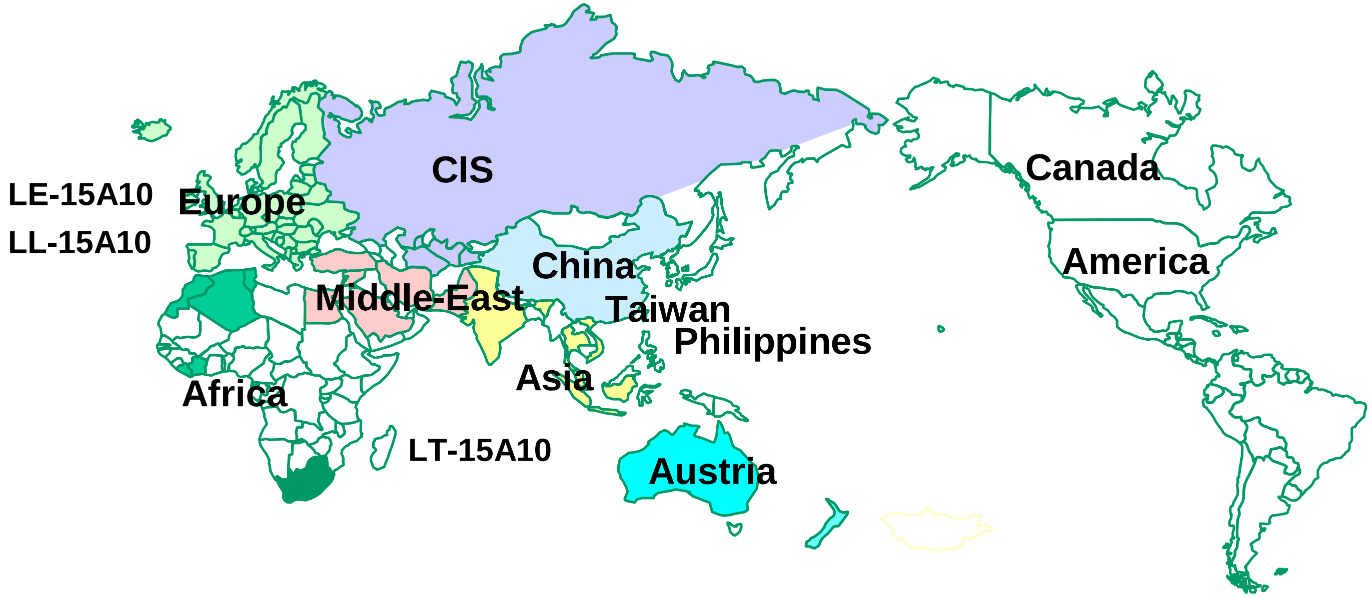
Welcome to

LG LCD TV



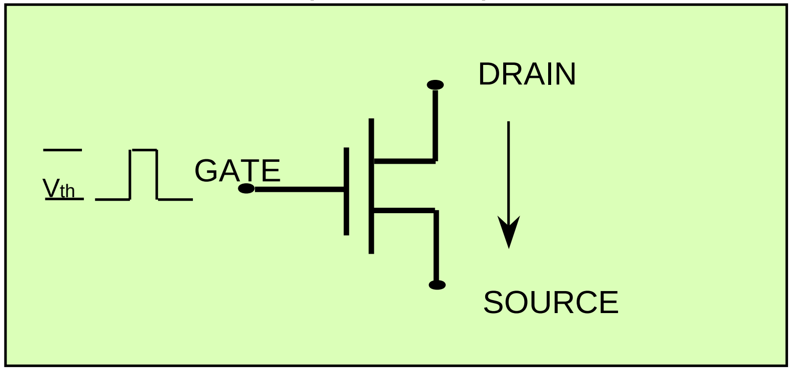
Contents

1. LCD Technology

1) What is TFT LCD ?
2) Structure of TFT LCD
3) TFT-LCD Operating Mechanism
4) Operating Theory
5) Structure LCD Module
6) Structure of Back light
7) Function of Back light
8) Key Parts ; Color Filter, Polarizer

What is TFT(Thin Film Transistor)?

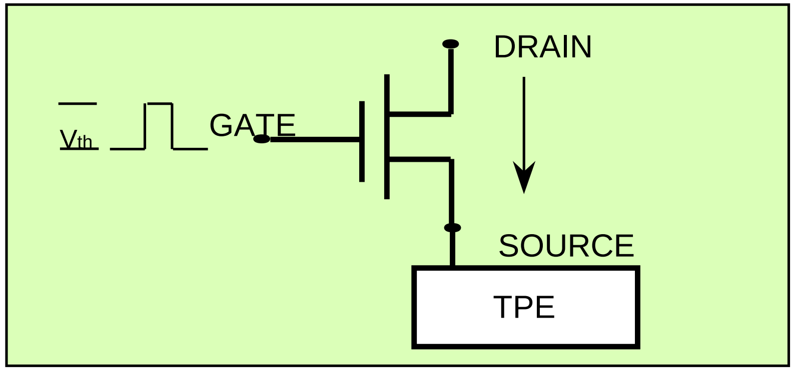
TRANSISTOR
(MOS-FET)



When supply over certain voltage(Vth) to the GATE, it delivers information from Drain to Source

⇨ SWITCHING Characteristics

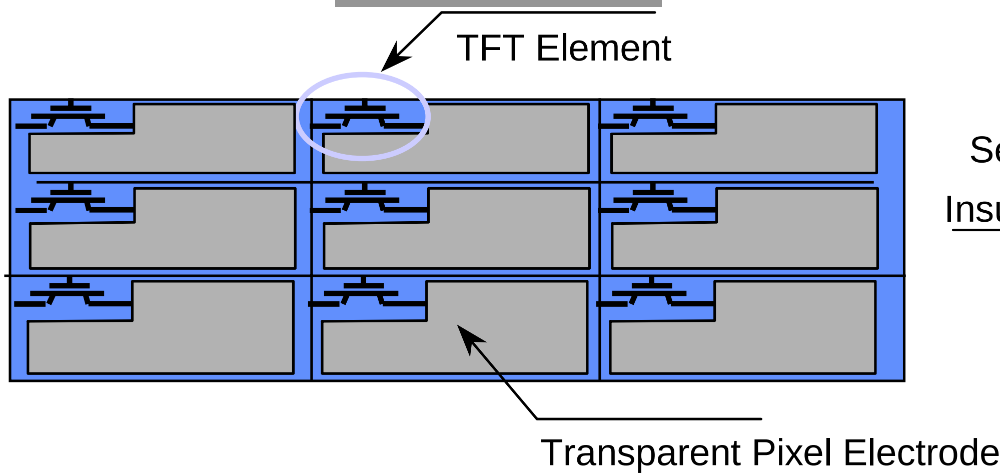
TFT



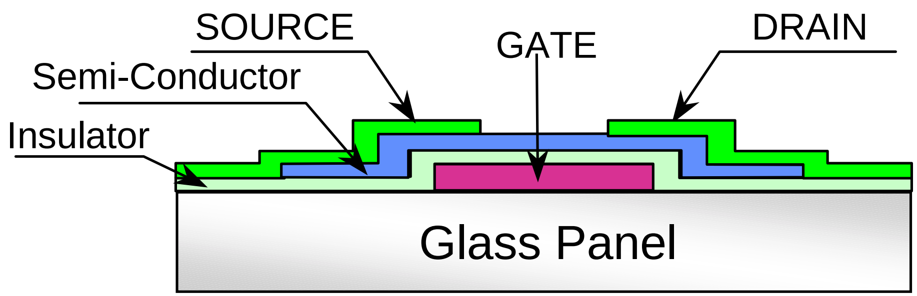
Compound Transistor with thin film in every Pixel on ITO.

⇨ Independent on neighboring Pixel

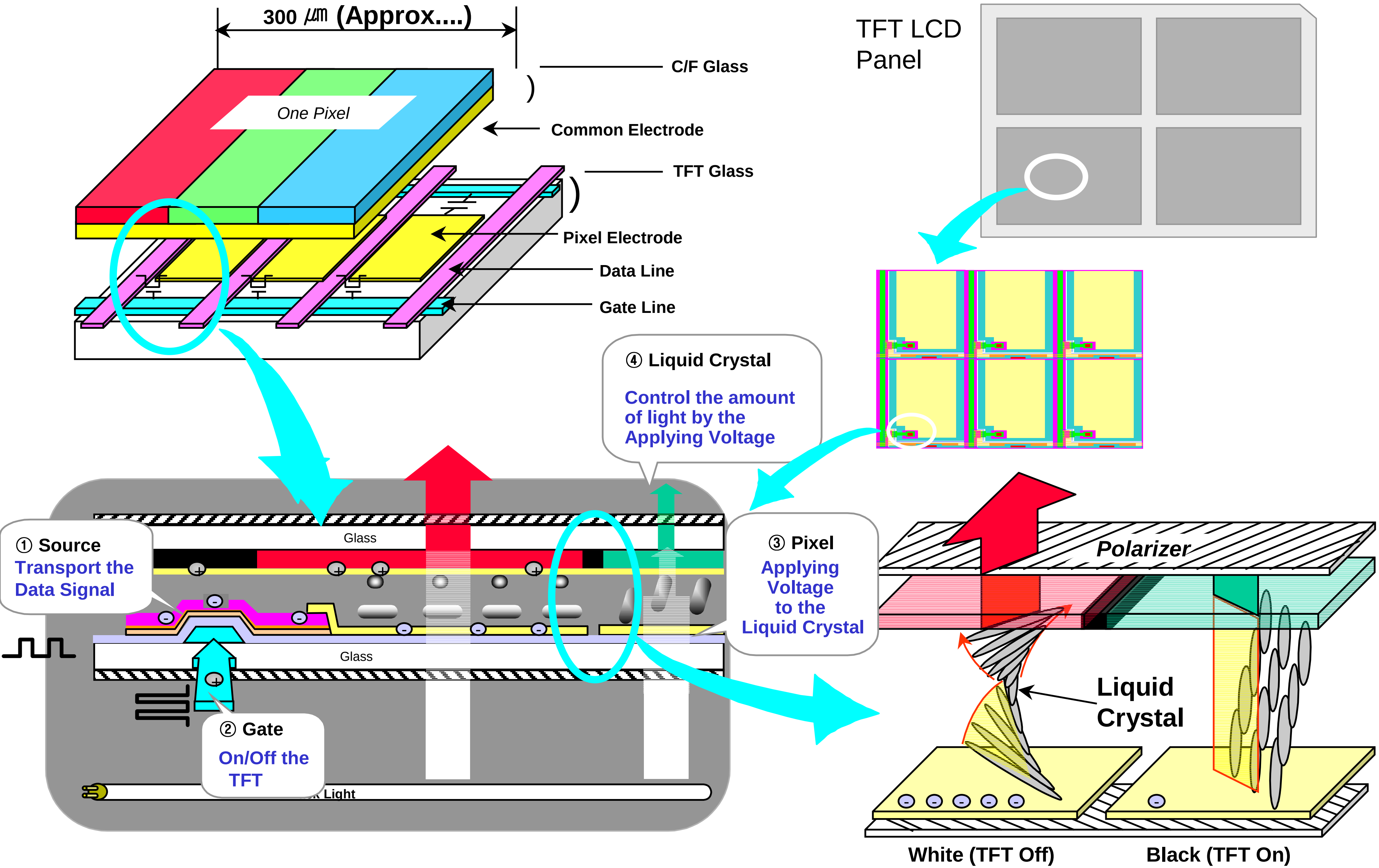
TFT Panel



TFT Cross section



Structure of TFT- LCD

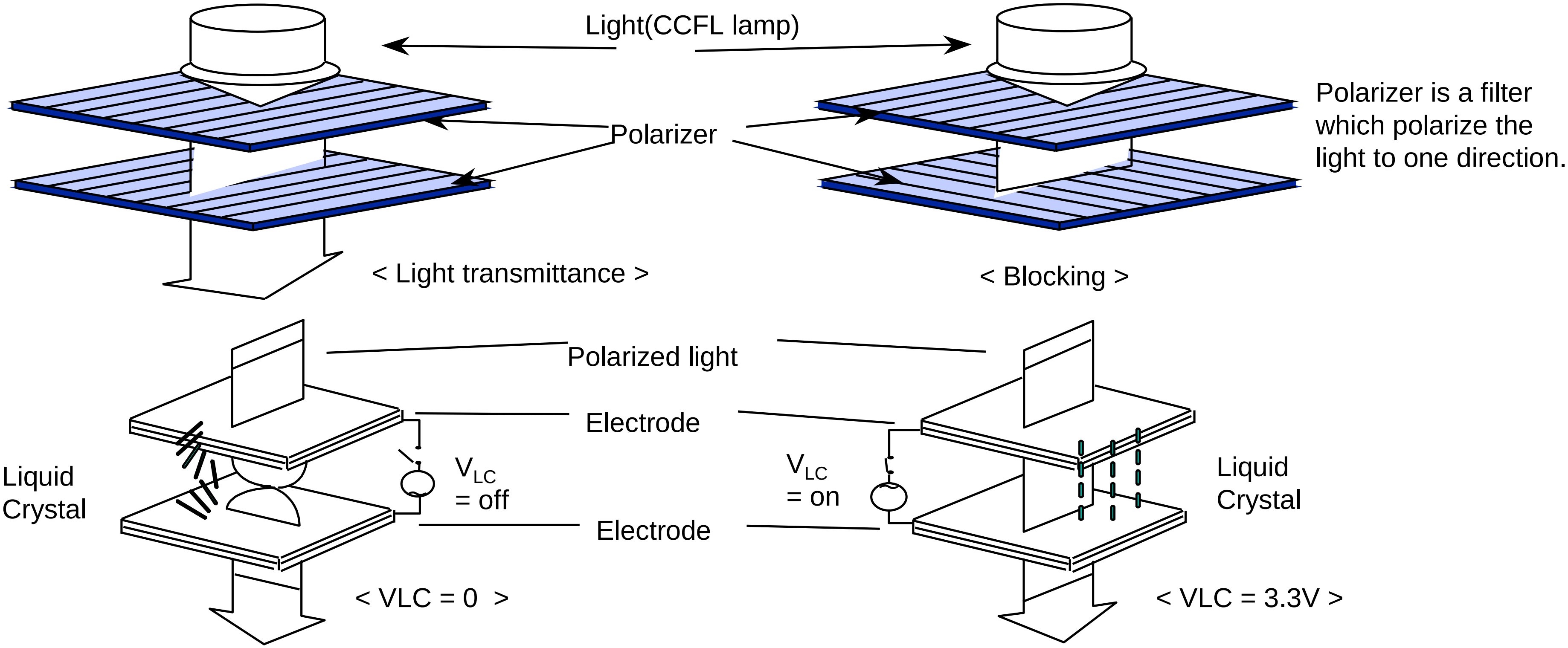


TFT- LCD Operating mechanism

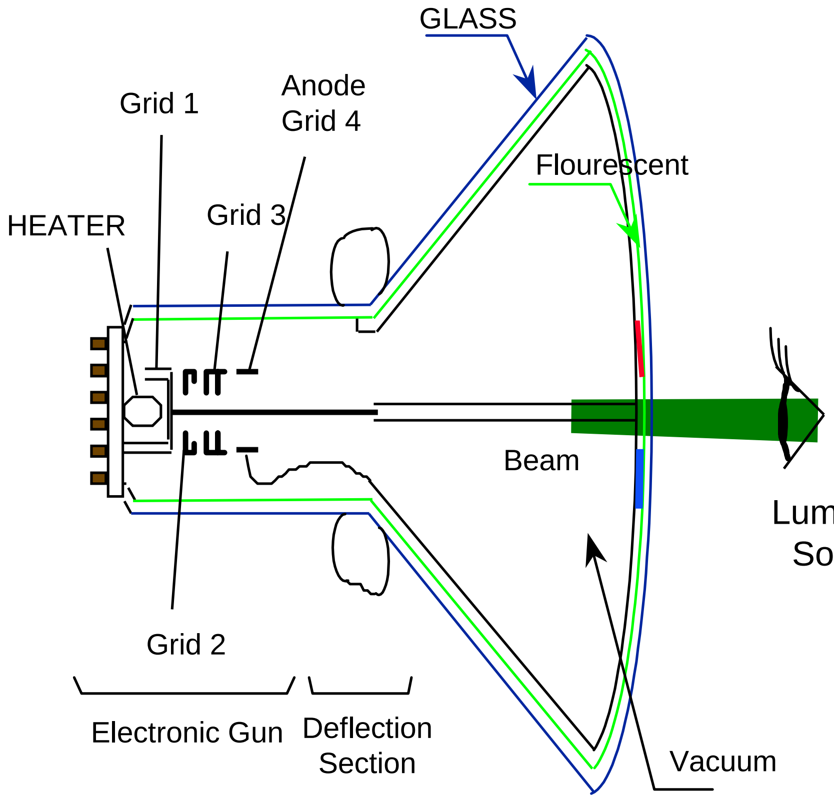
The structure of TFT-LCD is that Liquid Crystal is being filled between C/F Glass & TFT Glass. One Pixel consists of 3 sub-Pixels(R,G,B) and according to the number of the pixels, Display Resolution (SVGA,XGA,etc) is determined.

The TFT Matrix consists of Data Line(Carrying display data signal),Gate Line(Carrying signal for turn On/Off the TFT).Each TFT, on each sub-pixel, controls the amount of Applying Voltage between C/F glass electrode & TFT glass electrode for the Liquid Crystal.

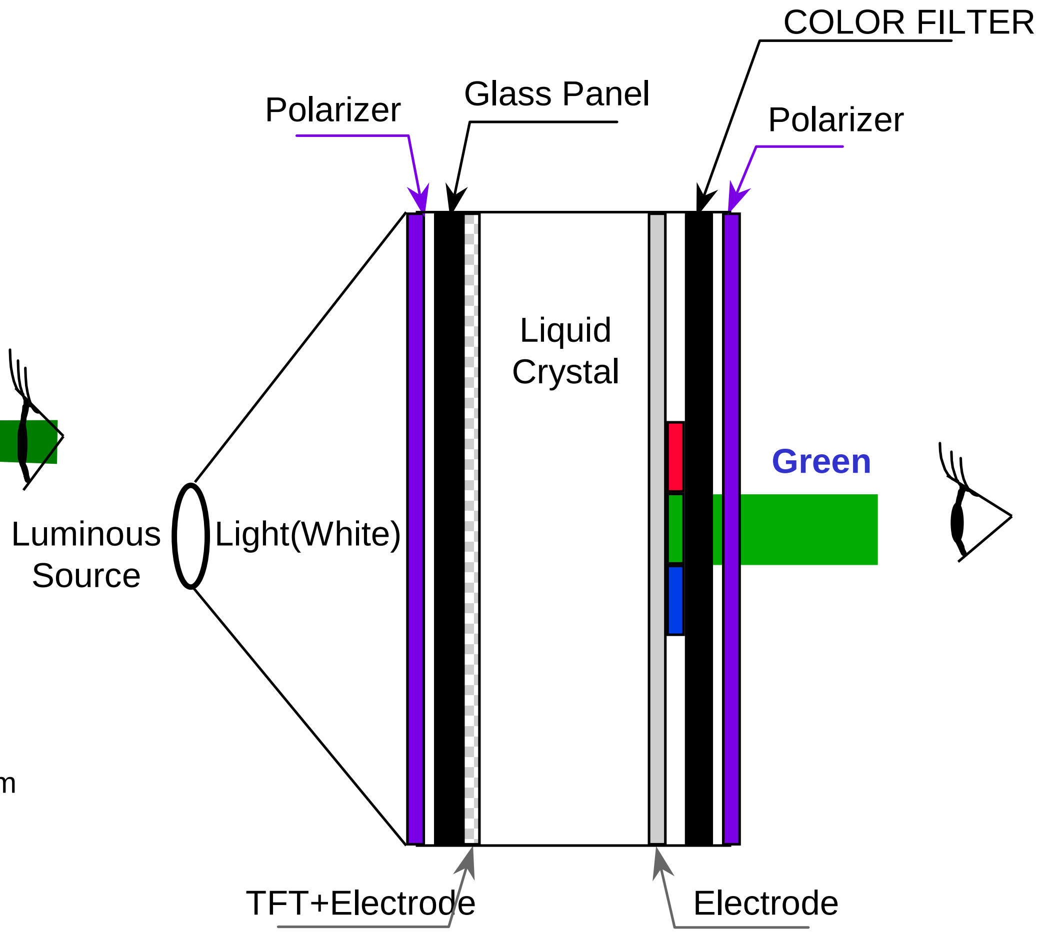
The Applying Voltage changes the Direction of Liquid Crystal which changes direction of the Light. Transmittance rate of the Polarized Light, polarized by Polarizer, is controlled by Applying Voltage. As a conclusion, Displayed Light is now under-control of Display Data Signal.



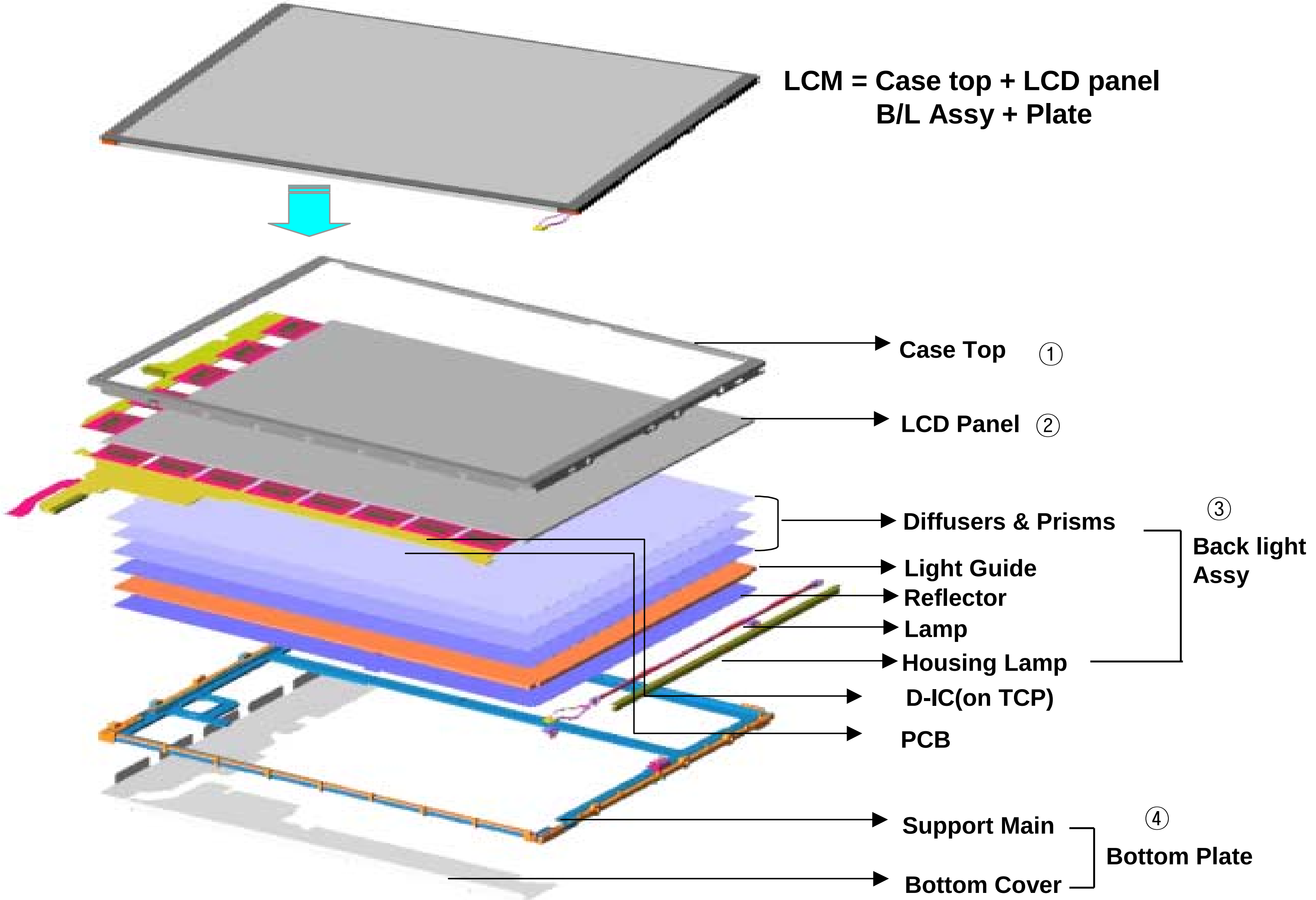
(Braun Tube : Light Emitting Component)



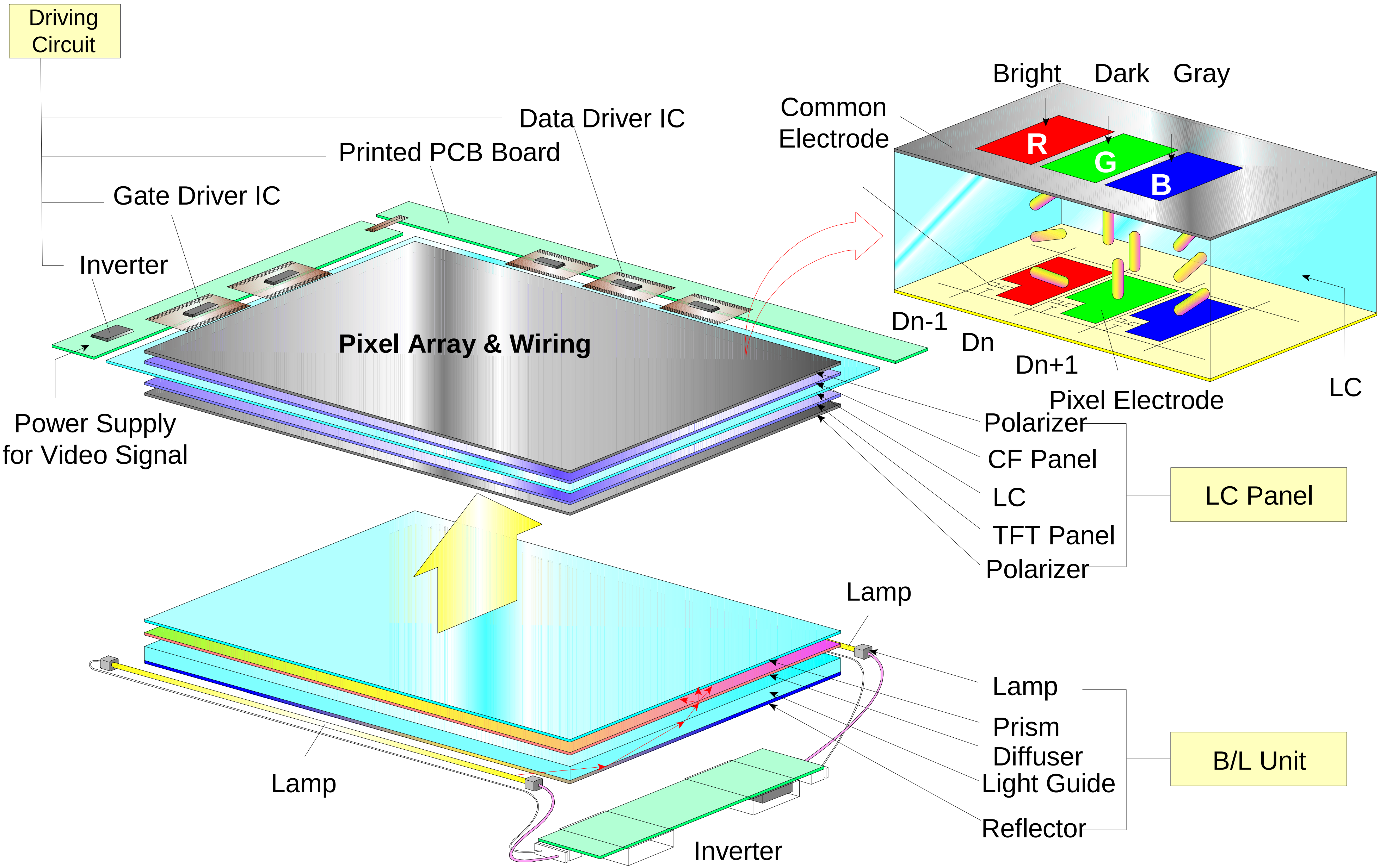
(TFT-LCD : Non-Light Emitting Component)



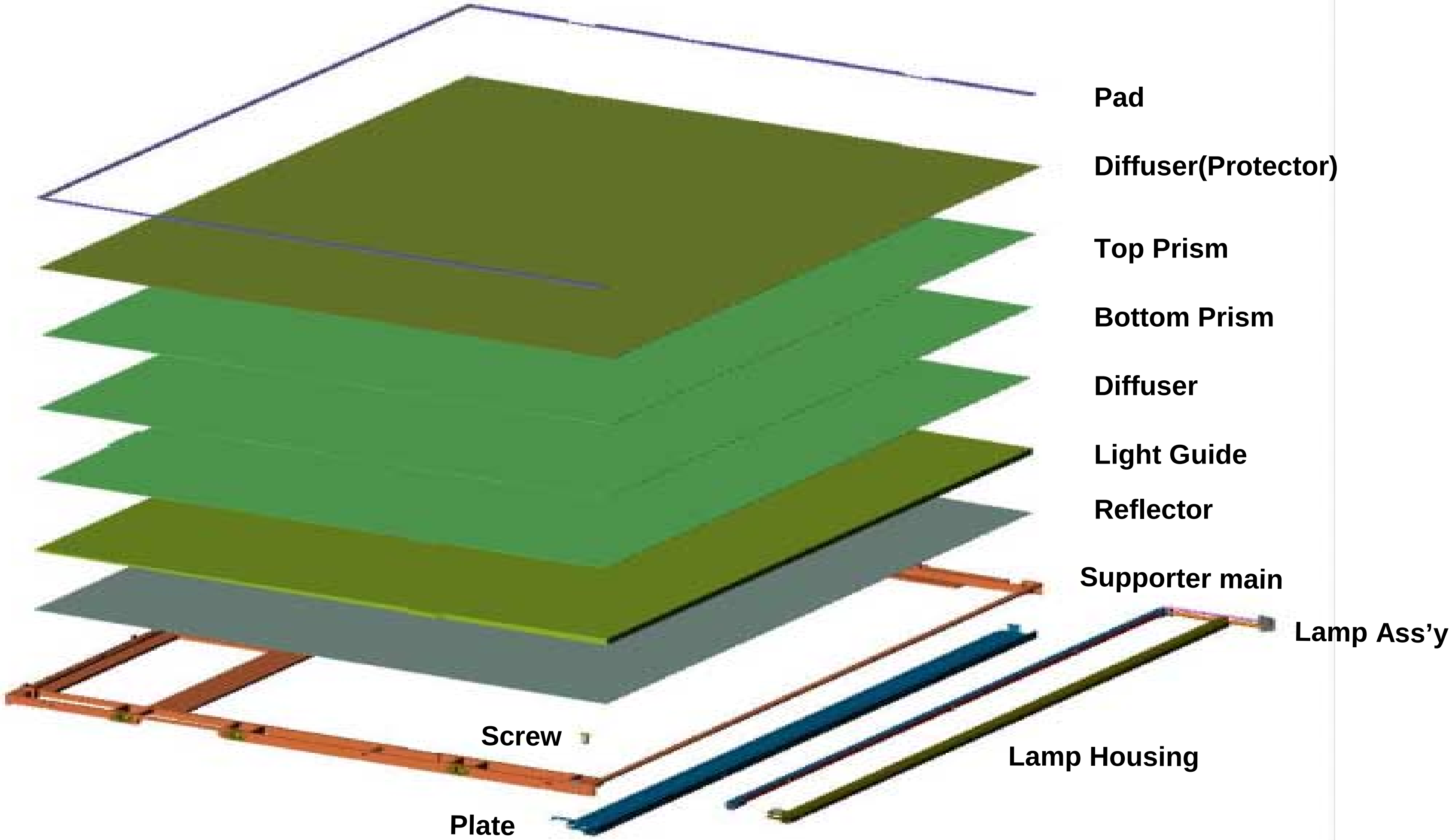
Structure of LCD Module



Structure of LCD Module

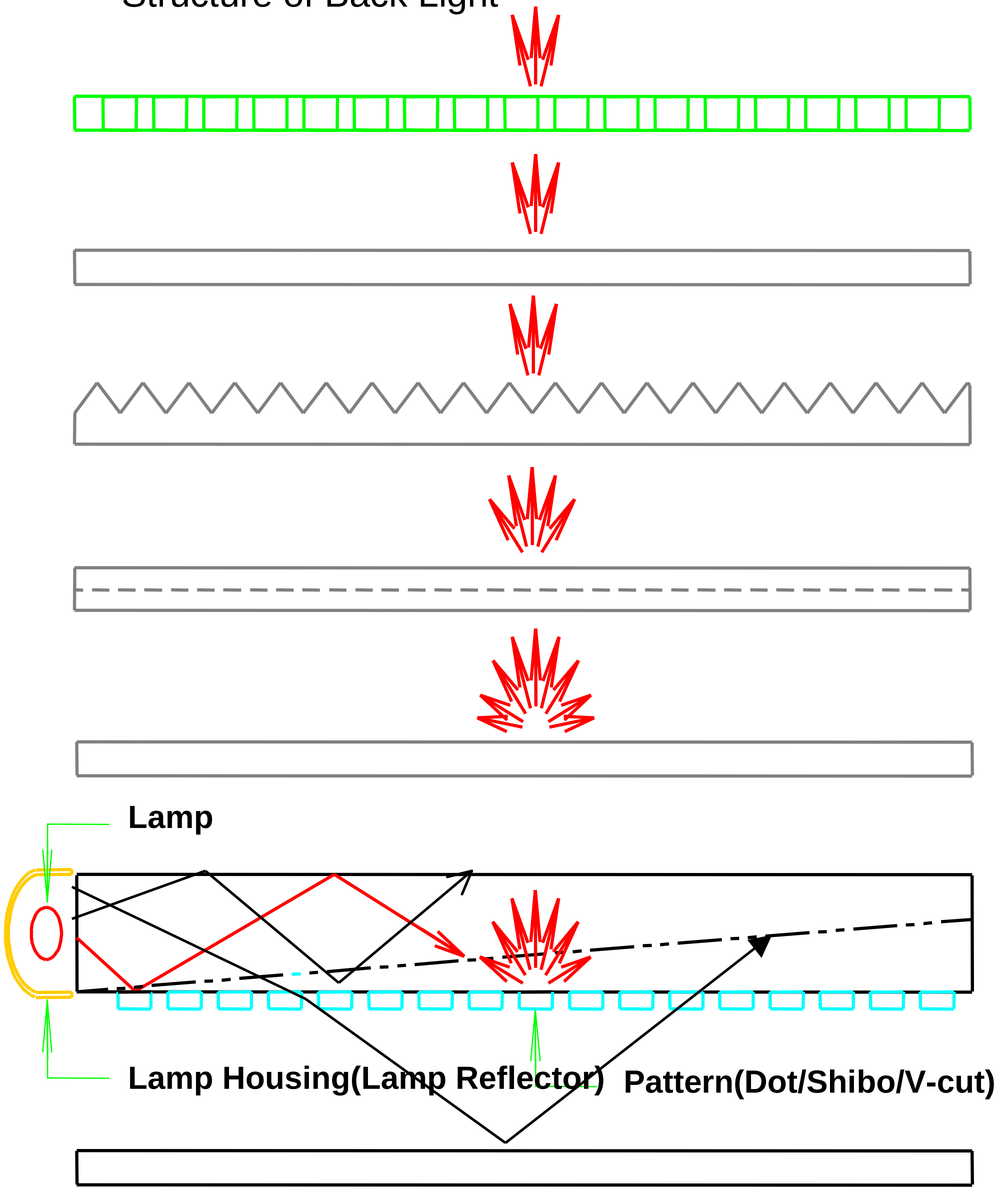


Structure of Back Light Unit



Function of Back Light

Structure of Back Light



Function on each part

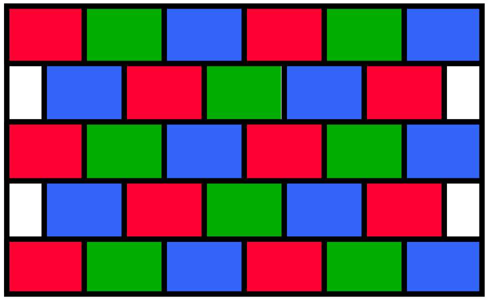
LCD PANEL	Display the light controlled by data signal
Diffuser (Protector)	Same structure as bellow diffuser, Protect the top prism
Top Prism	Same function as bottom prism, Increase the luminance up to 1.33 times of bottom prism
Bottom Prism	Concentrate the light and increase the luminance up to 1.55 times of the light guide
Diffuser	Uniform and concentrate the light received from light guide
Light guide (Flat/Wedge)	Guide the light from lamp and uniform the light
Reflector	Reflect the leakage light from light guide to reduce the loss of the light injected to the light guide

Key Parts : Color Filter

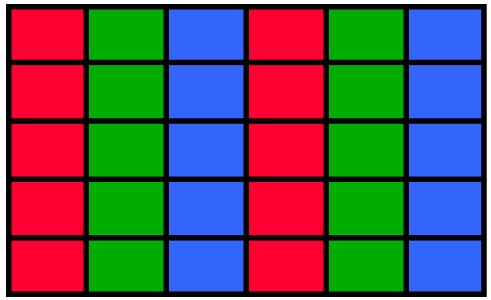
To realize color of the Display, array Red,Green & Blue color paint beneath Upper Glass Panel regularly in accord with Pixel electrode of lower Glass Panel.

- Kinds of Pixel Array

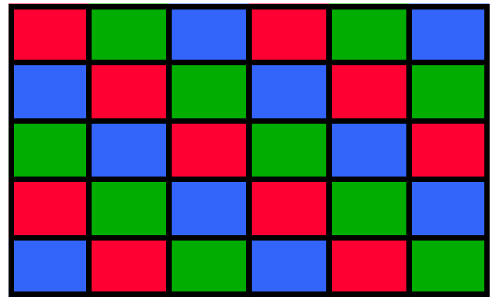
① Delta Array



② Stripe Array

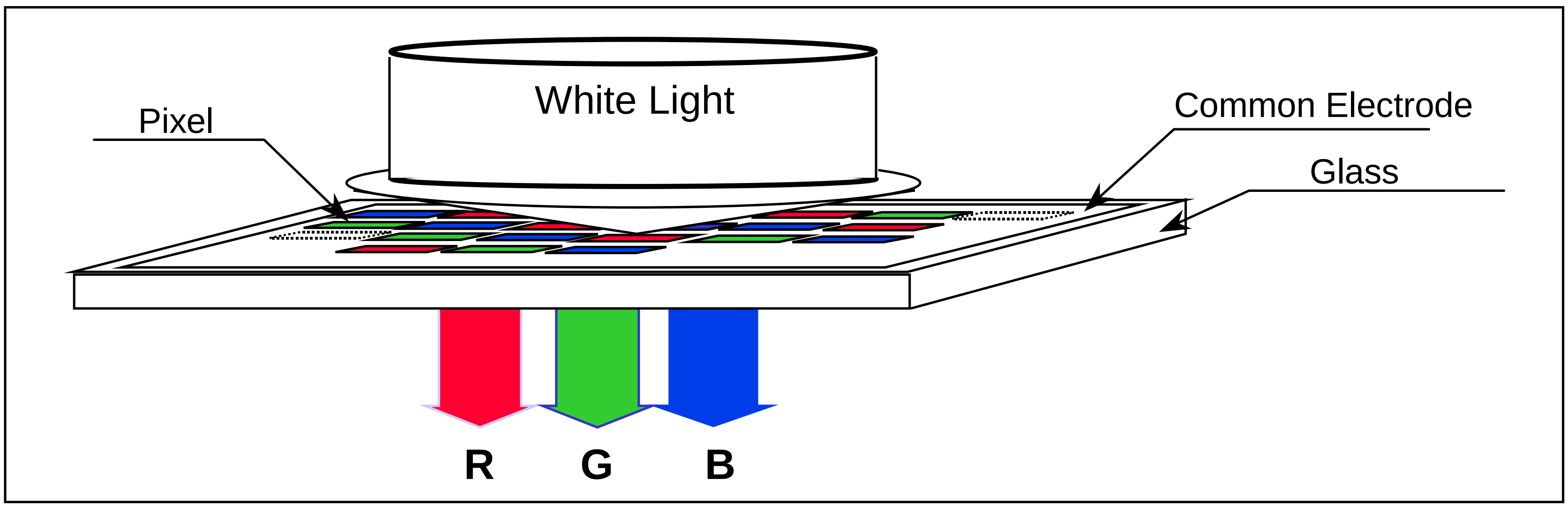


③ Mosaic Array

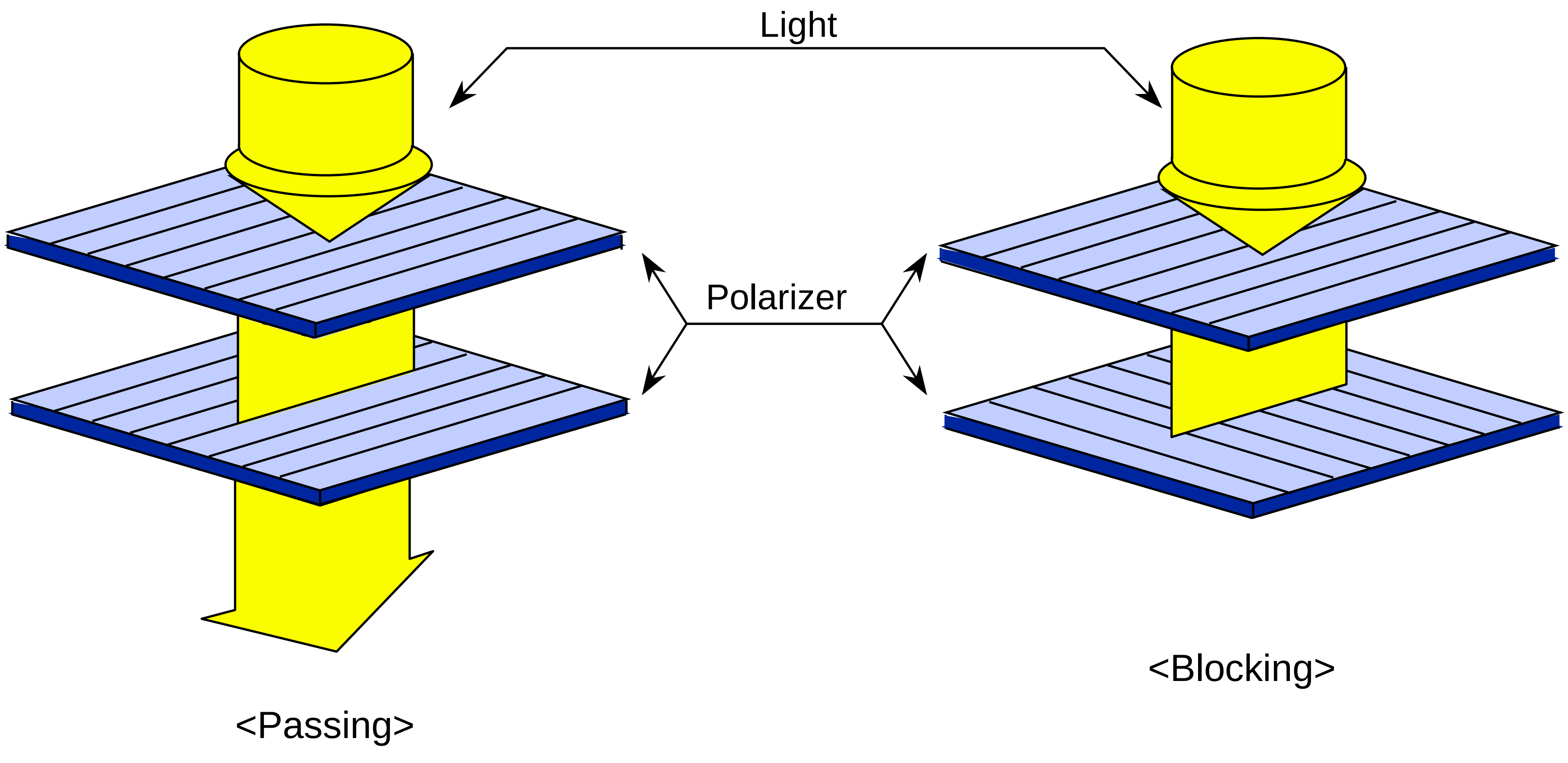


- The Function of Color Filter

Divide the white light from luminous source into Red, Green & Blue

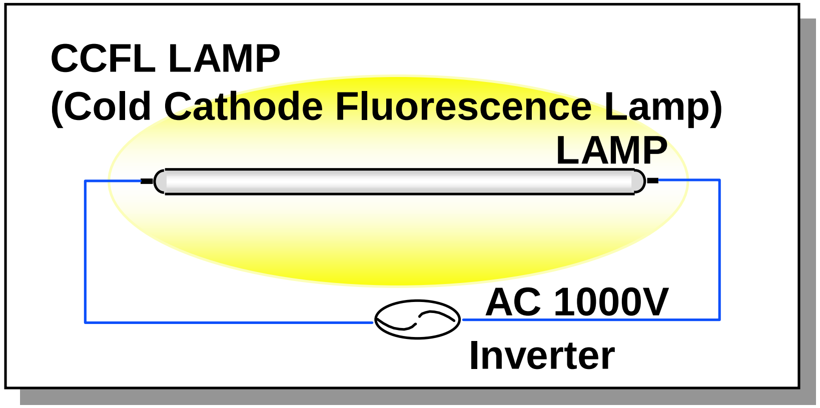


A kind of filter, which polarize light one direction.

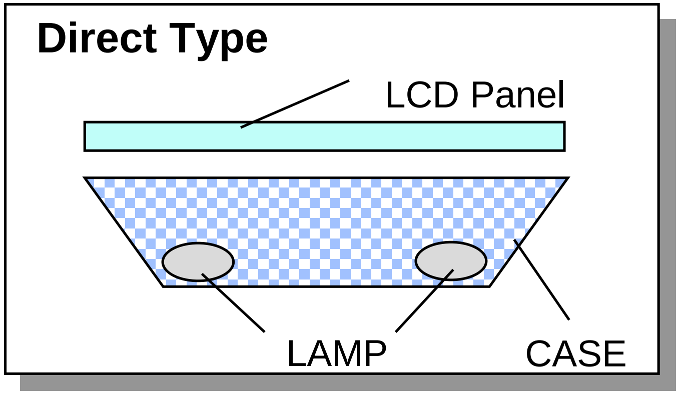
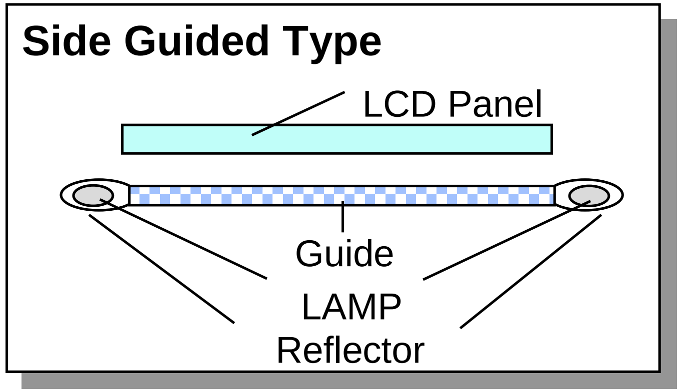


Key Parts : Back Light

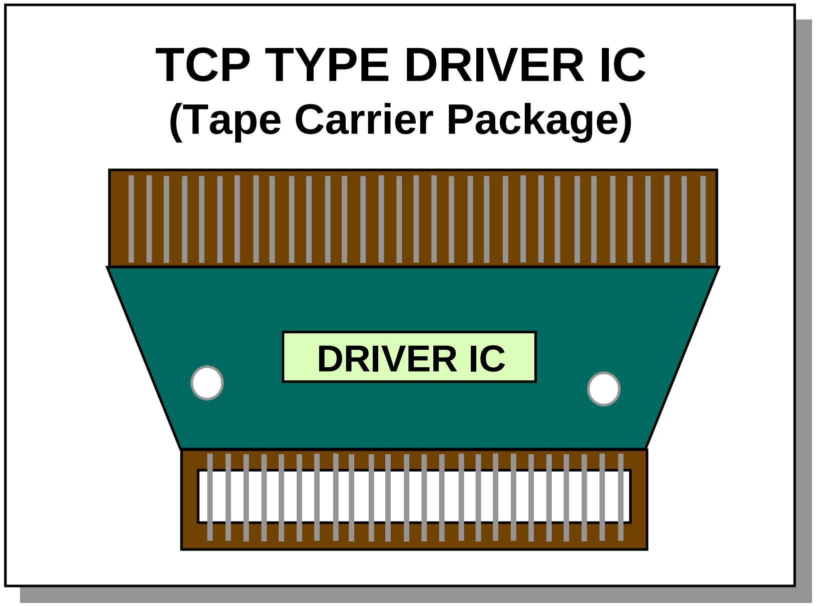
Back Light Unit,located behind TFT-Panel lower Glass, and supplies light to the PANEL.



- Can realize White Light
- Long life time(Appr. 25,000HRS)
- Simple Brightness control
- Small Size
- ⇨ Easy to Adhere

	Direct Type	Side Guided Type
Structure		
Merits	High Light Efficiency Simple Structure	Slim & Compact Size
Demerits	Thick	Complicated Structure,Expensive Low Light Efficiency

Supplies the signal from PCB to TFT-PANEL



GATE DRIVER IC(8EA) : Horizontal

Supplies signals from Data line to the Gate of TFT-PANEL sequentially. Each IC controls 128 lines in horizontal.

SOURCE DRIVER IC(5EA) : Vertical

Supplies the Pixel Data from SOURCE to each Pixel when the Gate of TFT PANEL ON. Each IC controls 154 lines in vertical.

2. LCD Market Trends

(1) Comparison with other Display devices

(2) World Display Market Trend

(3) LCD TV Market Trend

(4) Guidance of handling LCD products

(5) Abbreviations

Comparison with other Display devices

		Large Screen	Basic Functions					
		Over 40"	Full Color	Contrast	Brightness	Resolution	View Angle	Response Time
CPT	Normal	△	◉	◉	◉	○	◉	◉
	Flat	△	◉	◉	◉	○	◉	◉
LCD		△	◉	○	○	◉	○	○
PDP*		◉	○	◉	○	○	◉	◉
VFD**		△	○	◉	○	○	◉	◉

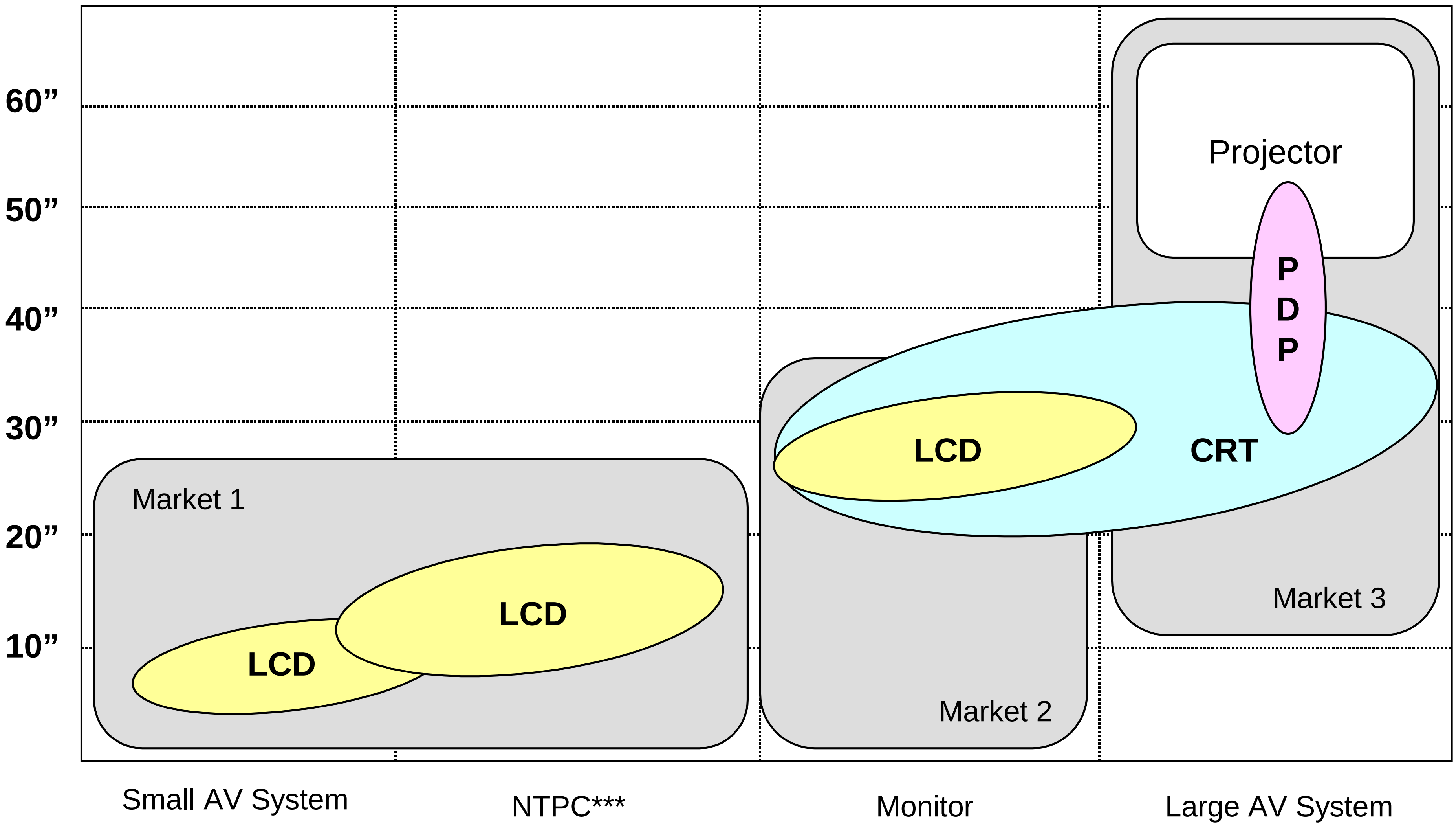
*PDP : Plasma Display Panel
**VFD : Vacuum Flourescent Display

◉ : Very Good(Possible to realize)

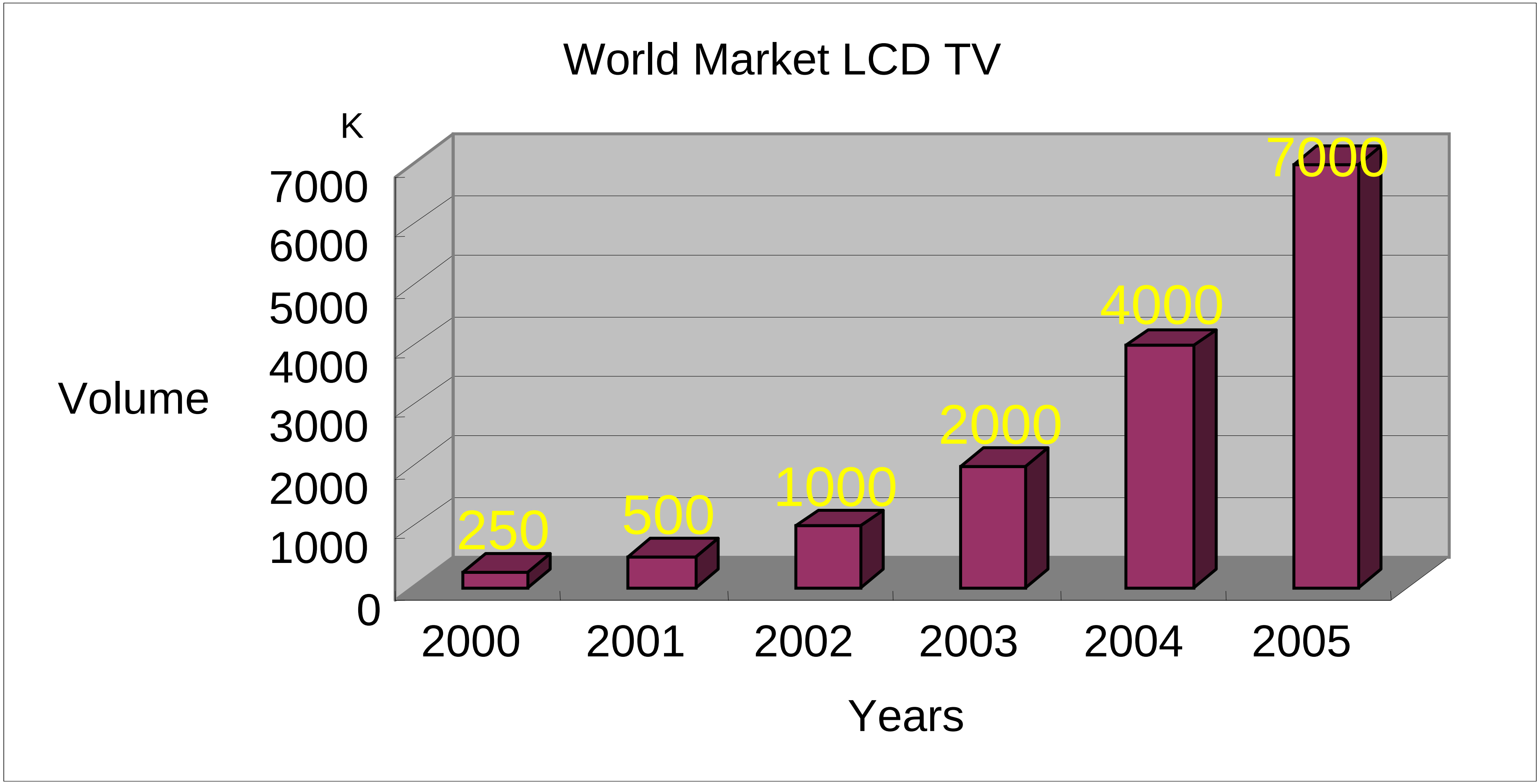
○ : Good(Hard to realize)

△ : Bad(Impossible to realize)

World Display Market Trend



NTPC : NoteBook PC



Source : IDC JAPAN

Guidance of handling Color TFT LCD Module

Color TFT LCD Module is very sensitive both electrically and physically.Users, therefore, are requested to follow the "Guidance of handling color TFT LCD Module" on the followings.

1 **Be careful not to make scratch on the polarizer.** - Surface of polarizer is soft and can be physically damaged easily. - Please do not touch, push or rub polarizer surface with materials over HB hardness.	**5** **High temperature & high humidity reduce the life-time.** - LCD is not proper to be used at high temperature and high humidity. - Please keep specified temperature and humidity condition.
2 **Keep clean the surface.** - Please wear rubber glove when touch the surface of LCD screen. - Please use soft and anti-static material with n-Hexane as cleaner.	**6** **Keep out of Corrosive Gas.** - Corrosive gas effect the polarizer and the circuit chemically and cause defects accordingly.
3 **Keep out of water.** - Water on/in the LCD may cause electrical short or corrosion. - Please wipe out or dry water carefully.	**7** **Electrostatic discharge can make damage** - There are electro-static sensitive components such as CMOS in LCD Module. - Please earth human body when handle the LCD.In addition, please do not touch the interface connector pin with bare
4 **Prevent swift Temperature & Humidity change.** - Swift temperature and/or humidity change can make dew or ice which cause nonconformance such as malfunction.	**8** **Do not operate for a long time under the same pattern.** - Operating LCD for a long time under the same pattern can cause image persistence and can damage it. - Please follow following guidance. 1. Turn the power off when do not use. 2. Change the pattern periodically.

Abbreviations on LCD Module and TV

No	Terms	Full Description
1	ACF	Anisotropic Conductive Film
2	B/L	Back Light
3	CCFL	Cold Cathode Fluorescent Lamp
4	CF	Color Filter
5	CR	Contrast Ratio (White / Black)
6	FPD	Flat Panel Display
7	LC	Liquid Crystal
8	LCD	Liquid Crystal Display
9	LCM	Liquid Crystal Module
10	LD	Line Defect
11	MNT	Monitor
12	POL	Polarizer
13	Pixel	Picture Element
14	TAB	Tape Automatic Bonding
15	TCP	Tape Carrier Package
16	TFT	Thin Film Transistor

LG LCD TV

1) General Specification
- Key Value
- Specifications
- Monitor Features
- Unique Features

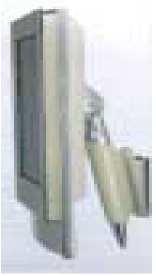
2) Presentation for SVC Engineer
- Specifications
- Exploded View
- Interconnection Guide
- Block Diagram
- IIC Adjustment
- MICOM Pinning & Descriptions
- Video Processing
- Audio Processing

LE/LL/LT-15A10




Without Stand


Stand type


Wall mounting

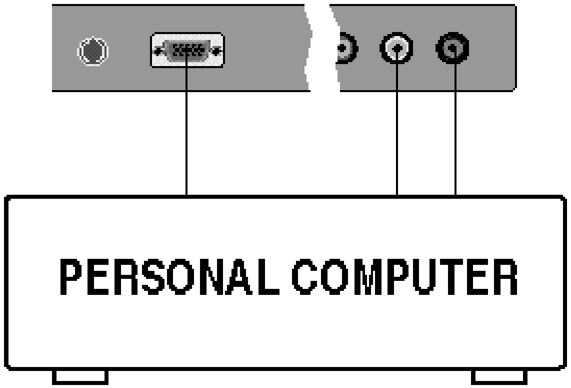
KEY VALUE

-. Great Design
- . Modern Style
- . Slim
- . Free space

-. Dual Functionality
- . Computer Monitor
  Up to XGA 1024X768 85Hz
- . Independent TV Receiver

-. High-Tech
- . LCD
- . HD Compatible
- . Component Input(Optional)-ME
- . SCART Jack(Optional)-EU

PC Input



1. Connect the signal cable from the monitor out socket of the personal computer to the input socket of the set.
2. Connect the audio cable from the PC to the Audio socket of the set.
3. Press the TV/AV/PC button to select PC Mode
4. Switch on the PC Mode, and the PC Screen automatically appears on the set. The set can be operated as the PC monitor.

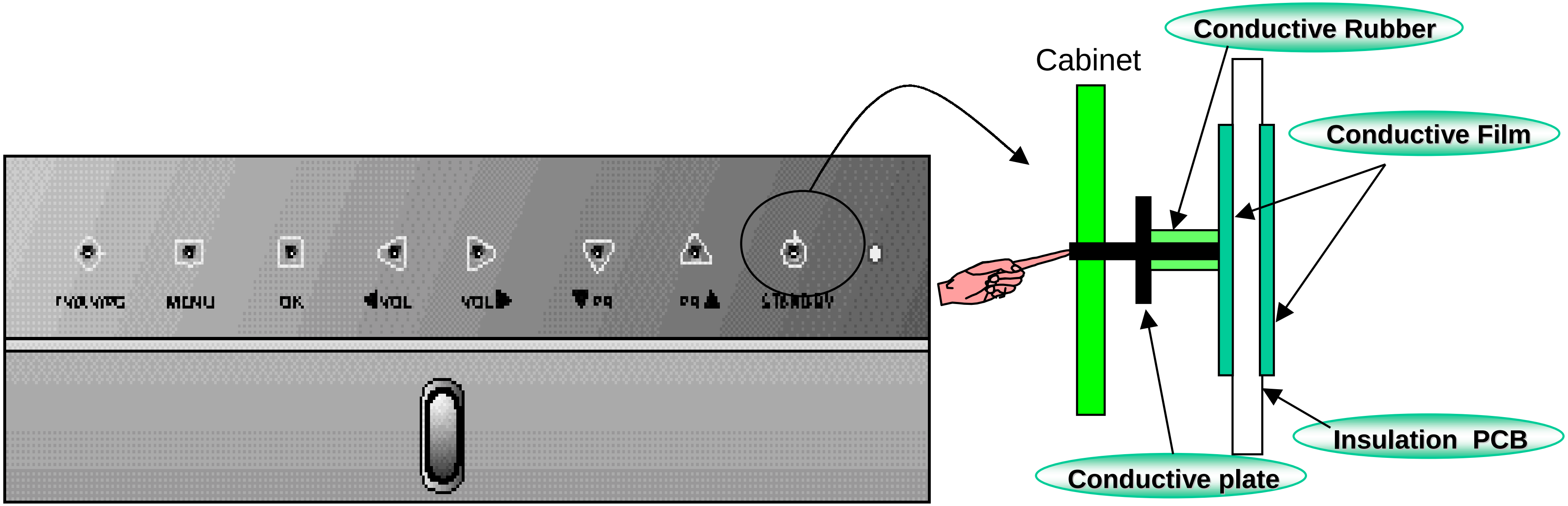
Mode	Resolution	Horizontal Freq.(KHz)	Vertical Freq.)Hz)
VGA	640 X 480 640 X 480 565 X 496 640 X 480 640 X 480 720 X 400	31.5kHz 35kHz 37.9kHz 37.5kHz 43.3kHz 31.5kHz	60Hz 67Hz 72Hz 75Hz 85Hz 70Hz
SVGA	800 X 600 800 X 600 800 X 600 800 X 600 800 X 600 832 X 624	35.2kHz 37.9kHz 48.1kHz 46.9kHz 53.7kHz 49.7kHz	56Hz 60Hz 72Hz 75Hz 85Hz 75Hz
XGA	1024 X 768 1024 X 768 1024 X 768 1024 X 768	48.4kHz 56.5kHz 60.2kHz 68.7kHz	60Hz 70Hz 75Hz 85Hz

Note :

1. Check the PC Mode before exchanging the new monitor(LG), the PC Mode should be within a mode in the table listed . If over XGA mode, after change the PC mode to one mode of table listed (<u>**If possible, use the 1024 X 768 @60Hz**</u> ***video mode to obtain the best image quality for you*. <u>**and then exchange the monitor**</u>).
2. When the PC screen appears on the set, some message may be appear on the screen, and the message is different depend on Window system version(Win98,2000)--Next Page
3. If you have an Apple Macintosh, **connect the VGA adaptor block from the 3 row 15 pin to 2 row 15 pin with the signal cable and connect the VGA adaptor block to the Macintosh**. <u>**The cable are not supplied**</u>, such as the signal cable, audio cable, VGA adaptor block for Macintosh PC.

Soft Touch Control

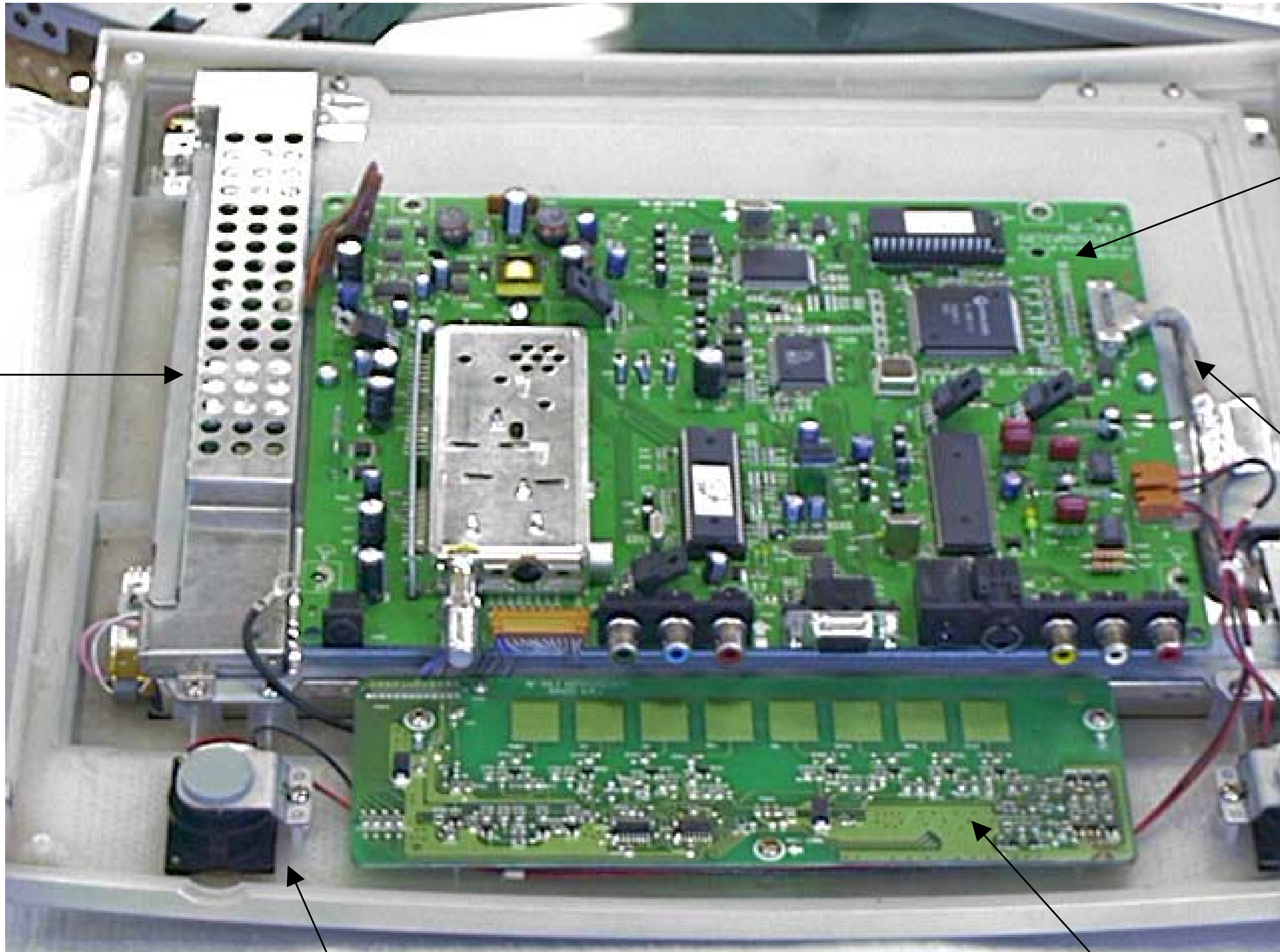
Soft Touch control system, LG's advanced technology, leads customers to the emotional satisfaction.
Its main characteristics are Anti-static function when touching besides softness & luxurious looking.

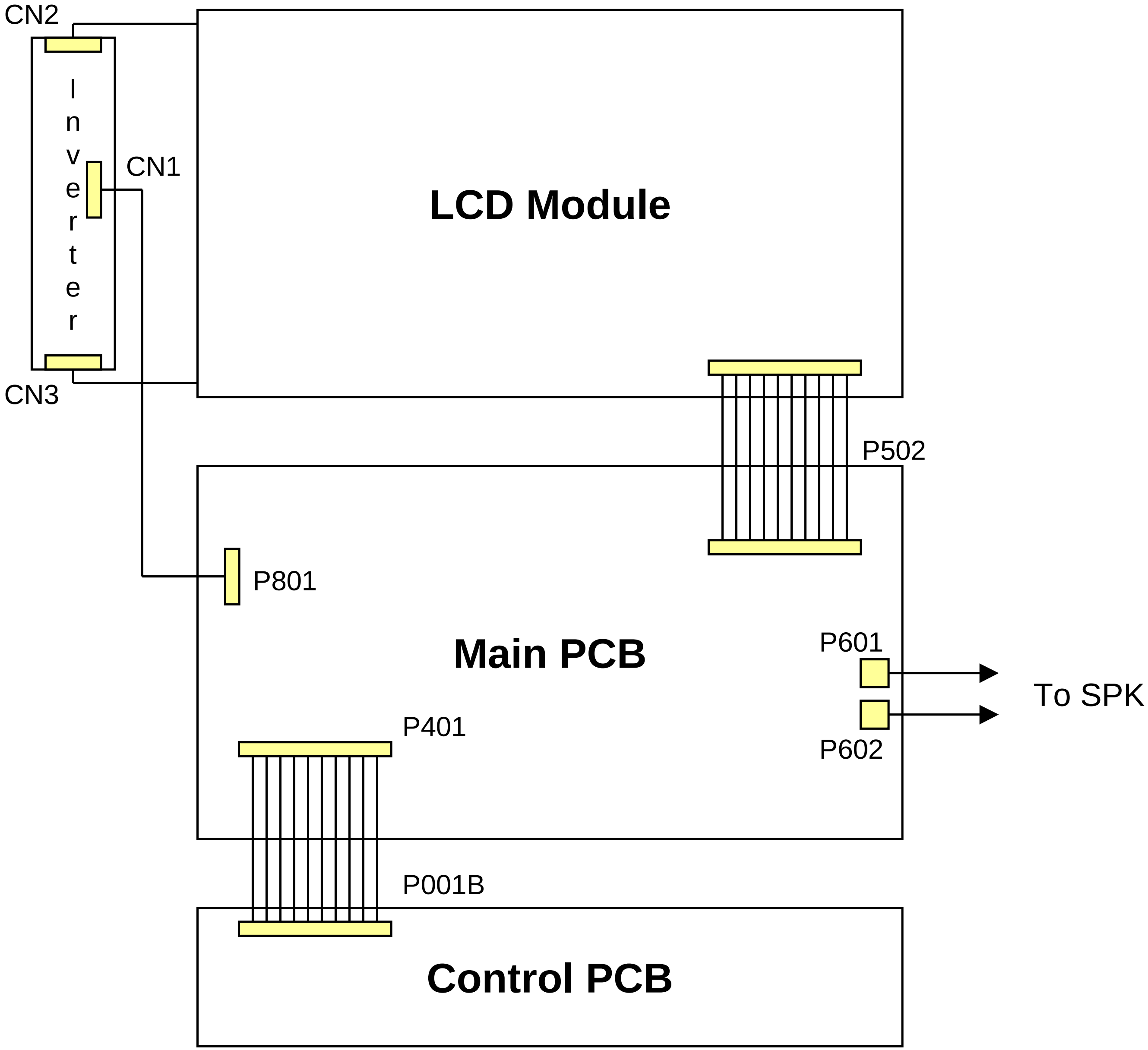


SYSTEM	PAL/SECAM-B/G, SECAM-L/L' PAL/SECAM-B/G,D/K, PAL-I PAL/SECAM-B,D,I, NTSC,4.43AV	LL-15A10 LE-15A10 LT-15A10
POWER	100-240V , 50/60Hz AC/DC Adapter 12V Power consumption : 30 W Stand by : 3W Below	
TUNING	FVS, 100Program(200 Optional) Auto/Manual programming ACMS+ With VPS & TXT Quick View	LT-15A10 (TTS Turbo search Sys.)
VIDEO	PSM -Dynamic, Standard, Mild, Game Digital comb filter Progressive scan	
SOUND	RF Stereo (A2, NICAM) DASP(4mode) AVL, Balance(stereo) Graphic equalizer Sound output : 1W + 1W (rms)	
OSD	Halftone OSD Menu (Window type OSD) Multilanguage * Program List & Edit Mode	
EXTERNAL CONNECTIONS	**Rear part** .Scart in .Video in .S-VHS in .DVD in (LT-15A10) .Headphone out .XGA-IN (D-SUB Jack)	LL/LE-15A10 (EU Model) LT-15A10

TELETEXT	FLOF/LIST/TOP*		TOP - Optional
USER CONVENIENT FEATURES	Soft Touch control Auto A/V Child Lock Easy picture control(PSM) Auto sleep Any key power on		
MONITOR	XGA 1024 X 768 85Hz		
LCD Panel	Type Size Pixel Format Display Type Pixel Pitch Color Depth Active Video Area Surface Back Light	Color Active Matrix TFT 15.1" (38.35cm) 1024 X 768 Pixel R / G / B Stripe 0.3 X 0.3mm 16Mil. Color, 8 bits 307 X 230mm Anti Glare, Hard Coating 2CCFL	
Optical	Viewing Angle Luminance Contrast Ratio	Left / Right : 75˚ Upward : 60 ˚ Downward : 55 ˚ 250Cd/m² 300	Contrast ratio ≥5
PC Input Sync	Input Signal Volt. Input Signal type Signal Polarity	Low = 0 ~ 0.8V High= 2.1 ~ 5.5V Separator Signal Positive & Negative	
Dot Spec	Dark Dot	1 Dot : Below 4 2 Dot : Below 1 Sub Total : below 5	Neighboring
Dot Spec	Bright Dot	1 Dot : Below 2 2 Dot : None Sub Total : below 2	Neighboring

*The Life Time is defined as the time at which brightness of lamp is 50% compare to that of initial value at the typical lamp current on condition of continuos operating at 25+/- 2 C.


MAIN PCB
INVERTER
Connector between
Main PCB and LCM
CONTROL PCB
SPEAKER (R)


CN2
Inverter
CN1
CN3
LCD Module
P502
P801
Main PCB
P601
To SPK
P401
P602
P001B
Control PCB

"SVC" key, or "OK" +"OK" → SVC mode → "YELLOW" key → ADJUSTMENT mode

RD 80
GD 80
BD 80
RO 32
GO 32
BO 32
S-B 23
PC CP 3

50 N AV1

Average ADJ. Data List		
RD	Drive Red	80
GD	Drive Green	80
BD	Drive Blue	80
RO	Red	32
GO	Green	32
BO	Blue	32

FP 21
NP 89
SP 38
S1VOL 105
S2VOL 105

50 N AV1

Initial Data List (PAL)		
FP	FM Prescaler	21
NP	NICAM Prescaler	89
SP	SECAM Prescaler	38
S1VOL	S1 VOL	105
S2VOL	S2 VOL	105

50 : Vertical Frequency (50=PAL, 60-NTSC)
N : Mode (N=normal, W=wide)
AV1 : TV/AV1/AV2

200PR 0
TEXT 1
I II SA 1
TOP 1
SCART 1
A2 ST 1
SYS 2

50 N AV1

102 Opt 1

ACMS 0
VOL 0
BBACK 0
LANG 0

50 N AV1

8 Opt 2

TSS 0
PANEL 0
IIC T 0
INVT 0
MD SA 0
MONO 1
CH+AU 0
T-LAN 14(0-16)

50 N AV1

4 Opt 3

◈ OPTION Part

OPTION-1

200PR	PR MEMORY
TEXT	TEXT Option
I II SA	DUAL Mode Save
TOP	TXT MODE
SCART	SCART Option
A2 ST	A2 Stereo
SYS	SYSTEM Select

0 : BG/I/DK
1 : BG/L
2 : BG/I/DK/M
3 : RESERVED

OPTION-2

ACMS	STATION Memory
VOL	VOL Curve Select
BBACK	BLUE BACK Option
LANG	OSD Language

OPTION-3

TSS	Turbo Search System
PANEL	PANEL Option
IIC T	AGC Option
INVT	Inverter Option
MD SA	Last Mode Save
MONO	MONO Option
CH+AU	CHINA,AU Option
T-LAN	TXT Language(0-16)

OPTION-4

OSD	OSD Language
T-LAN	TEXT Language

OPTION - 1

OPTION	CODE	FUCTION	REMARK
200PR	0	100 PROGRAM	
	1	200 PROGRAM	Only China without TXT
TEXT	0	Without TEXT	
	1	TEXT	
I II SA	0	DUAL I	
	1	MODE SAVE	
TOP	0	No TOP TEXT	
	1	TOP TEXT	
SCART	0	W/O SCART	
	1	WITH SCART	
A2 ST	0	NO A2 STEREO	
	1	A2 STEREO	
SYS	0	BG/I/DK	LE Model(EU)
	1	BG/L	LL Model(FRANCE)
	2	BG/I/DK/M	LT Model(Middle East)
	3	RESERVED	

OPTION - 2

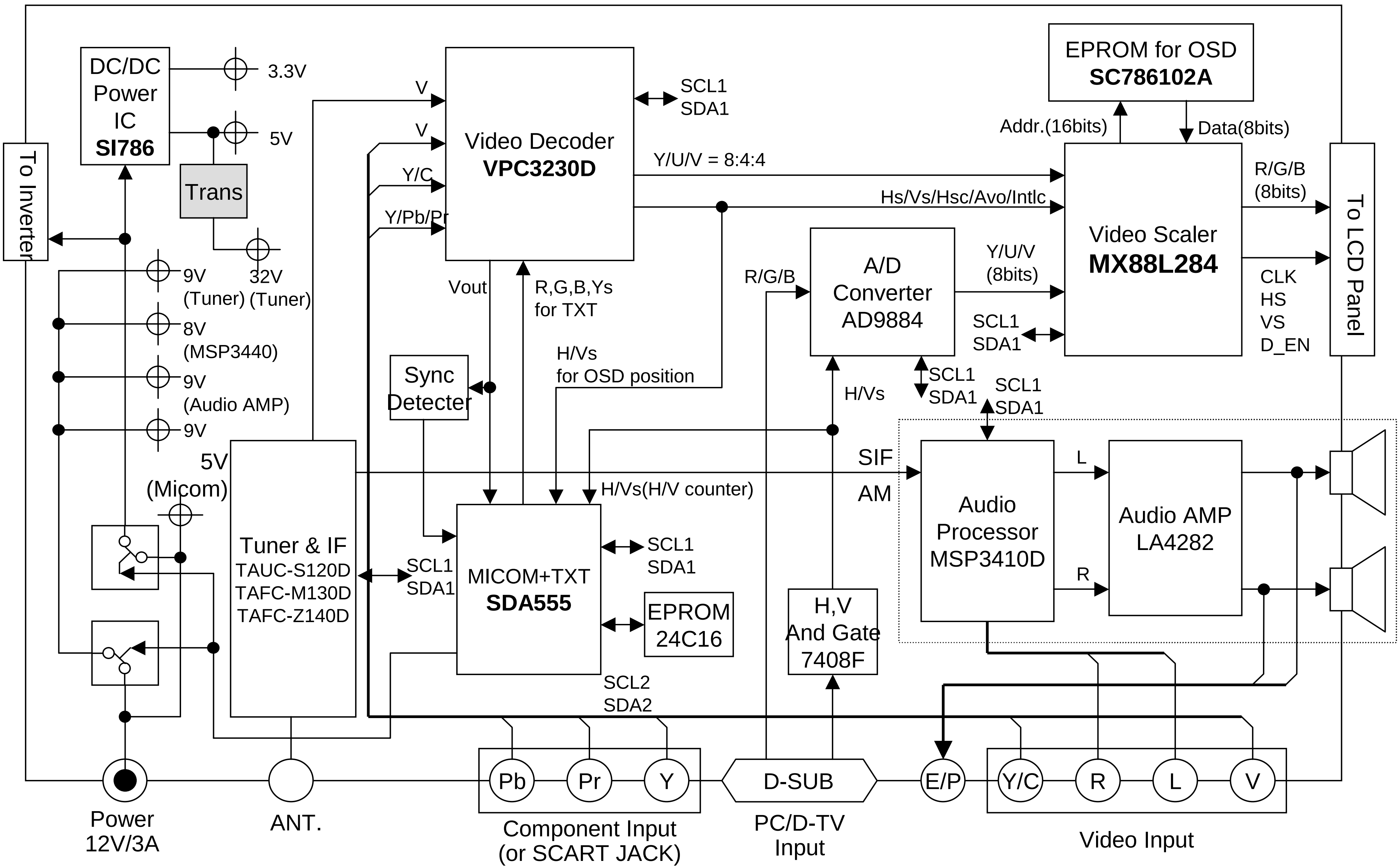
OPTION	CODE	FUCTION	REMARK
ACMS	0	No Channel Name Memory	Only AUSTRALIA
	1	Channel Name Memory	Except AUSTRALIA
VOL	0	Slow VOLUME Change	Normal Curve
	1	Steep VOLUME Change	Rushed Curve
BBACK	0	W/O BLUE BACK	
	1	With BLUE BACK	
LANG	0	ENG Only	
	1	EU-5EA	
	2	EU ETC	
	3	FARSI	
	4	ARAB URDU	
	5	E+CHINA	
	6	RESERVED	
	7	RESERVED	

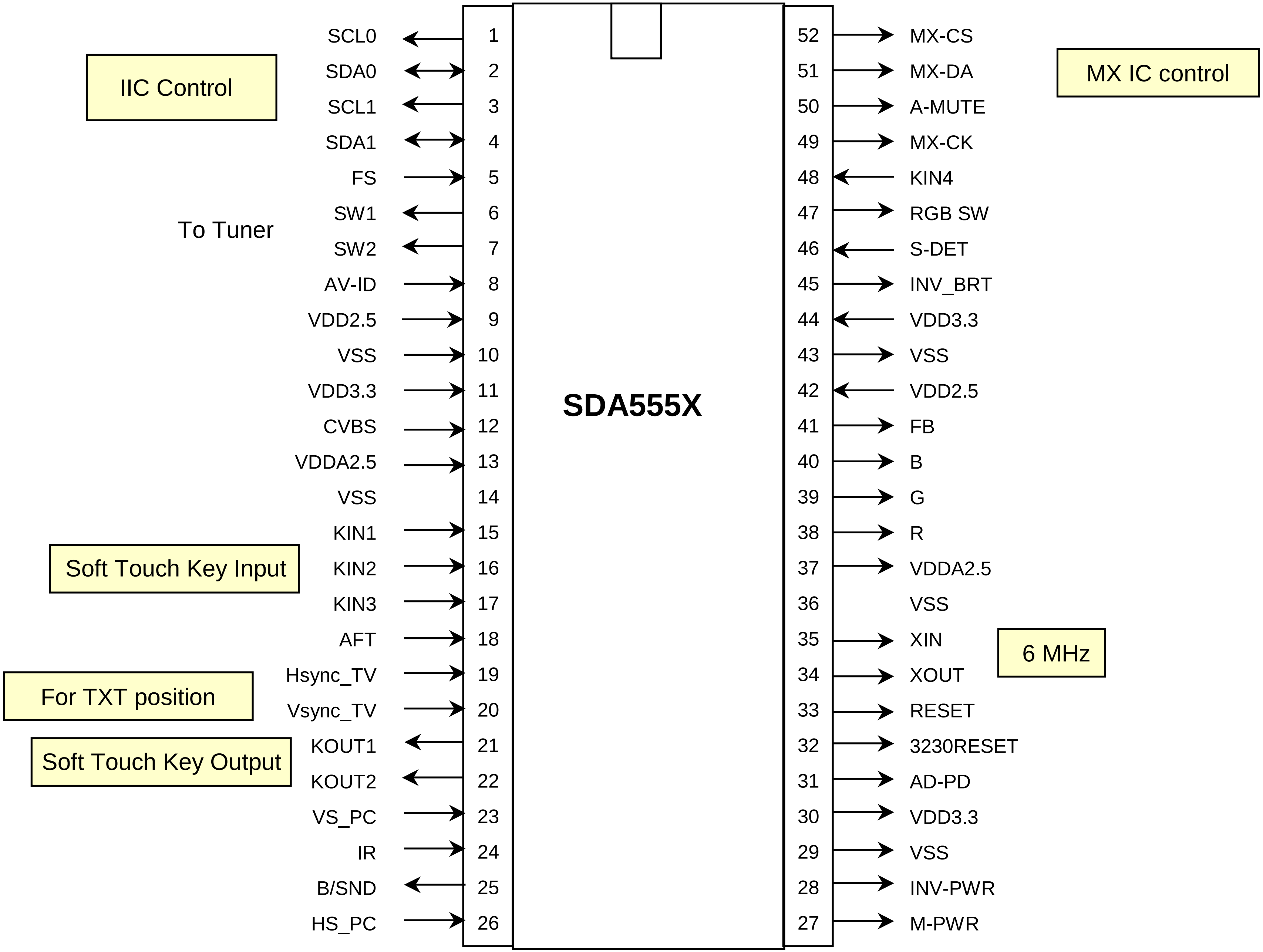
OPTION - 3

OPTION	CODE	FUCTION	REMARK
TSS	0	W/O Turbo Search System	
	1	WITH Turbo Search	
PANEL	0	PANEL	
	1	PANEL	
IIC T	0	MICOM AFT	
	1	TUNER AGC	
INVT	0	INVERTER	
	1	INVERTER	
MD SA	0	Last Mode Save	RF, AV Mode
	1	Last Mode Save	All Modes
MONO	0	No Forcible MONO Mode	
	1	Forcible MONO Mode	Only TUNISIA
CH+AU	0	Option OFF	Except China & Australia
	1	Option ON	China & Australia
T-LAN	2	TXT Language Select	0~16

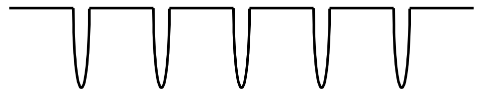
TELETXT

0	WEST EU	9	TURK GRE3
1	EAST EU1	10	ARAB FRA
2	TURKEY EU	11	ARAB ENG
3	EAST EU2	12	ARAB HEB1
4	CYRILLIC1	13	ARAB HEB2
5	CYRILLIC2	14	FARSI ENG
6	CYRILLIC3	15	FARSI FRA
7	TURK GRE1	16	FARSI ALL
8	TURK GRE2		


DC/DC Power IC SI786
3.3V
5V
Trans
32V (Tuner)
9V (Tuner)
8V (MSP3440)
9V (Audio AMP)
9V
5V (Micom)
To Inverter
Video Decoder VPC3230D
V
V
Y/C
Y/Pb/Pr
SCL1 SDA1
Vout
R,G,B,Ys for TXT
H/Vs for OSD position
Sync Detecter
EPROM for OSD SC786102A
Addr.(16bits)
Data(8bits)
Y/U/V = 8:4:4
Hs/Vs/Hsc/Avo/Intlc
Video Scaler MX88L284
R/G/B (8bits)
CLK HS VS D_EN
To LCD Panel
A/D Converter AD9884
R/G/B
Y/U/V (8bits)
SCL1 SDA1
H/Vs
SCL1 SDA1
SCL1 SDA1
Tuner & IF TAUC-S120D TAFC-M130D TAFC-Z140D
SCL1 SDA1
MICOM+TXT SDA555
H/Vs(H/V counter)
SCL1 SDA1
EPROM 24C16
SCL2 SDA2
H,V And Gate 7408F
SIF
AM
Audio Processor MSP3410D
L
R
Audio AMP LA4282
Pb Pr Y
D-SUB
E/P
Y/C R L V
Power 12V/3A
ANT.
Component Input (or SCART JACK)
PC/D-TV Input
Video Input

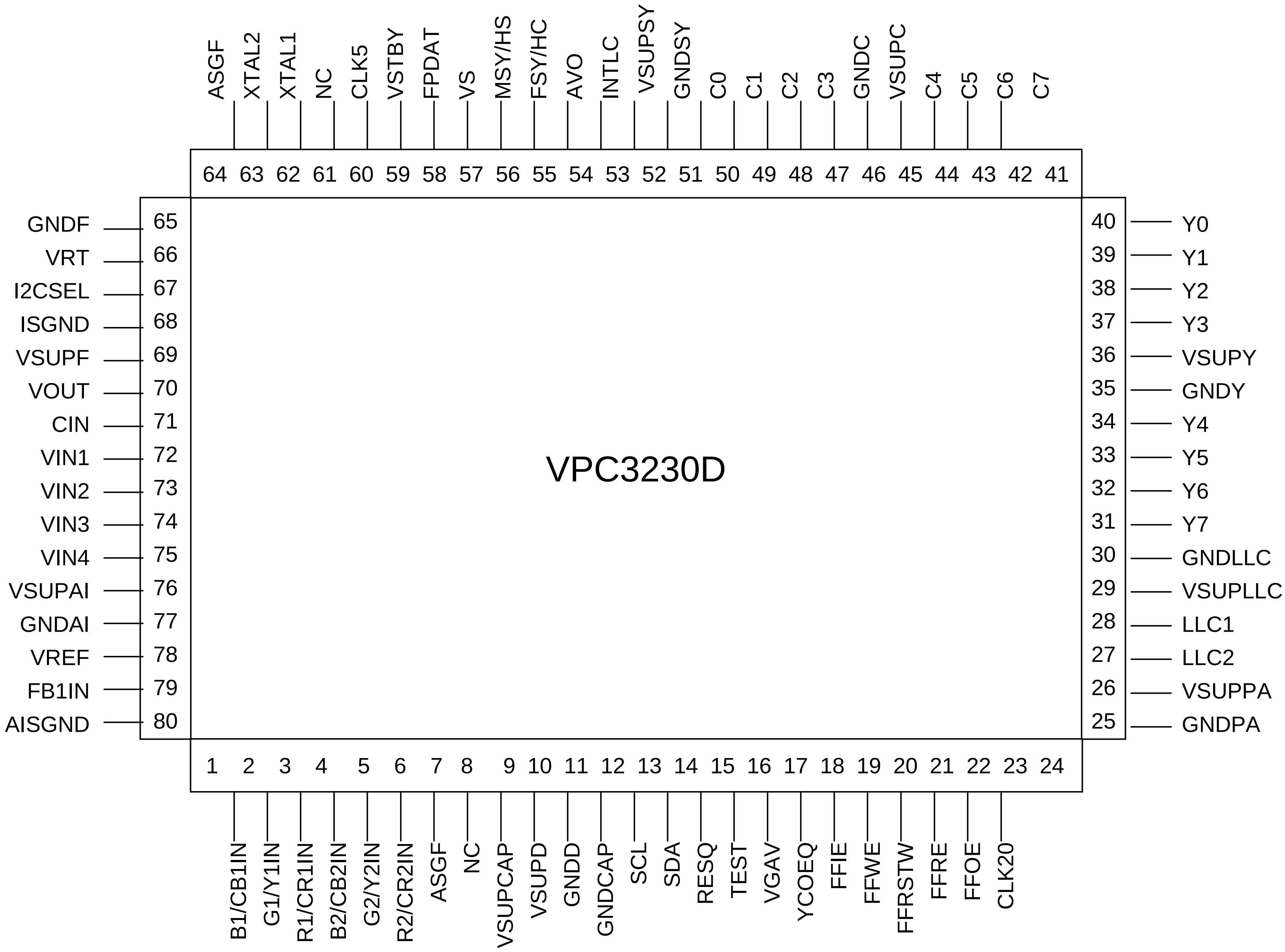

SDA555X
IIC Control
SCL0 1
SDA0 2
SCL1 3
SDA1 4
FS 5
To Tuner
SW1 6
SW2 7
AV-ID 8
VDD2.5 9
VSS 10
VDD3.3 11
CVBS 12
VDDA2.5 13
VSS 14
Soft Touch Key Input
KIN1 15
KIN2 16
KIN3 17
AFT 18
For TXT position
Hsync_TV 19
Vsync_TV 20
Soft Touch Key Output
KOUT1 21
KOUT2 22
VS_PC 23
IR 24
B/SND 25
HS_PC 26
MX IC control
52 MX-CS
51 MX-DA
50 A-MUTE
49 MX-CK
48 KIN4
47 RGB SW
46 S-DET
45 INV_BRT
44 VDD3.3
43 VSS
42 VDD2.5
41 FB
40 B
39 G
38 R
37 VDDA2.5
36 VSS
6 MHz
35 XIN
34 XOUT
33 RESET
32 3230RESET
31 AD-PD
30 VDD3.3
29 VSS
28 INV-PWR
27 M-PWR

<table>
<tr><th>No</th><th>Symbol</th><th>Function</th></tr>
<tr><td>1
2</td><td>SCL0
SDA0</td><td>.IIC Control with EEPROM</td></tr>
<tr><td>3
4</td><td>SCL1
SDA1</td><td>.IIC control with other Devices(TUNER,VPC3230,MSP3410,etc)</td></tr>
<tr><td>5</td><td>FS</td><td>.Factory Service mode(Data control during production)</td></tr>
<tr><td>6
7</td><td>SW1
SW2</td><td>.TUNER System control signal
<table>
<tr><th></th><th>SW1</th><th>SW2</th></tr>
<tr><td>BG/I/DK</td><td>H</td><td>L</td></tr>
<tr><td>NTSC-M</td><td>L</td><td>H</td></tr>
<tr><td>B/G</td><td>L</td><td>L</td></tr>
<tr><td>SECAM-L</td><td>H</td><td>L</td></tr>
<tr><td>SECAM-L’</td><td>H</td><td>H</td></tr>
</table></td></tr>
<tr><td>8</td><td>AV-ID</td><td>.AV identification signal input from pin8 of SCART</td></tr>
<tr><td>9</td><td>VDD2.5</td><td>.Voltage Supply(2.5V)</td></tr>
<tr><td>10</td><td>VSS</td><td>.Ground</td></tr>
<tr><td>11</td><td>VDD3.3</td><td>.Voltage Supply(3.3V)</td></tr>
<tr><td>12</td><td>CVBS</td><td>.Composite video signal input for TXT process</td></tr>
<tr><td>13</td><td>VDDA2.5</td><td>.Voltage Supply for Analog circuit</td></tr>
<tr><td>14</td><td>VSS</td><td>.Ground</td></tr>
<tr><td>15
16
17</td><td>KIN1
KIN2
KIN3</td><td>.Signal Input from Soft touch panel</td></tr>
</table>

No	Symbol	Function
18	AFT	.AFT signal input
19 20	Hsync_TV Vsync_TV	.H-Sync & V-Sync for TXT position from VPC3230
21 22	KOUT1 KOUT2	.Signal Output to Soft Touch panel 
23 26	VS_PC HS_PC	.Check the signal 100msec interval for PC signal
24	IR	.Remocon signal input
25	B/SND	.Beeper Sound output to Soft Touch PCB
27	M-PWR	.Main Power Control
28	INV-PWR	.Inverter Power control
29	VSS	.Ground
30	VDD3.3	.Voltage Supply(3.3V)
31	AD-PD	.Power control for AD9884(IC201). Turn off when Video & RF mode.
32	3230RESET	.Reset VPC3230 & MX IC when power on
33	RESET	.Monitors Main power supply for MICOM operation

No	Symbol	Function
34 35	XOUT XIN	.Main crystal(6MHz) connection for MICOM operation
36	VSS	.Ground
37	VDDA2.5	.Voltage Supply(2.5V)
38 39 40	R G B	.Teletext R,G,B signal output
41	FB	.Fast Blanking signal for Teletext
42	VDD2.5	.Voltage Supply(2.5V)
43	VSS	.Ground
44	VDD3.3	.Voltage Supply(3.3V)
45	INV_BRT	.Brightness control to Inverter(PWN control)
46	S-DET	.SCART FB signal input from 16 pin for Auto AV function
47	RGB SW	.Control RGB switching IC
48	KIN4	.Key Input from Soft Touch panel
49	MX-CK	.Clock output terminal to MX IC(IC501)

No	Symbol	Function
50	A-MUTE	.Sound Mute control when Channel up/down, Mode change & Power on/off.
51 52	MX-DA MX-CS	.Data communication terminal with MX IC(Data & CS)


VPC3230D
1 B1/CB1IN
2 G1/Y1IN
3 R1/CR1IN
4 B2/CB2IN
5 G2/Y2IN
6 R2/CR2IN
7 ASGF
8 NC
9 VSUPCAP
10 VSUPD
11 GNDD
12 GNDCAP
13 SCL
14 SDA
15 RESQ
16 TEST
17 VGAV
18 YCOEQ
19 FFIE
20 FFWE
21 FFRSTW
22 FFRE
23 FFOE
24 CLK20
25 GNDPA
26 VSUPPA
27 LLC2
28 LLC1
29 VSUPLLC
30 GNDLLC
31 Y7
32 Y6
33 Y5
34 Y4
35 GNDY
36 VSUPY
37 Y3
38 Y2
39 Y1
40 Y0
41 C7
42 C6
43 C5
44 C4
45 VSUPC
46 GNDC
47 C3
48 C2
49 C1
50 C0
51 GNDSY
52 VSUPSY
53 INTLC
54 AVO
55 FSY/HC
56 MSY/HS
57 VS
58 FPDAT
59 VSTBY
60 CLK5
61 NC
62 XTAL1
63 XTAL2
64 ASGF
65 GNDF
66 VRT
67 I2CSEL
68 ISGND
69 VSUPF
70 VOUT
71 CIN
72 VIN1
73 VIN2
74 VIN3
75 VIN4
76 VSUPAI
77 GNDAI
78 VREF
79 FB1IN
80 AISGND

1. Features

Video Decoding

- 4 Composite inputs, 1 S-VHS input
- Composite video & sync output
- integrated high-quality A/D converters
- Adaptive 2H comb filter Y/C separator
- 1H NTSC comb filter
- Multi-standard color decoder(1 Crystal)
- Multi-standard sync decoder
- Black line detector

Video Decoding

- Horizontal scaling(0.25 to 4)
- Panorama vision
- Black level expander
- Dynamic peaking
- Soft limiter(gamma correction)
- Color transient improvement

RGB Processing

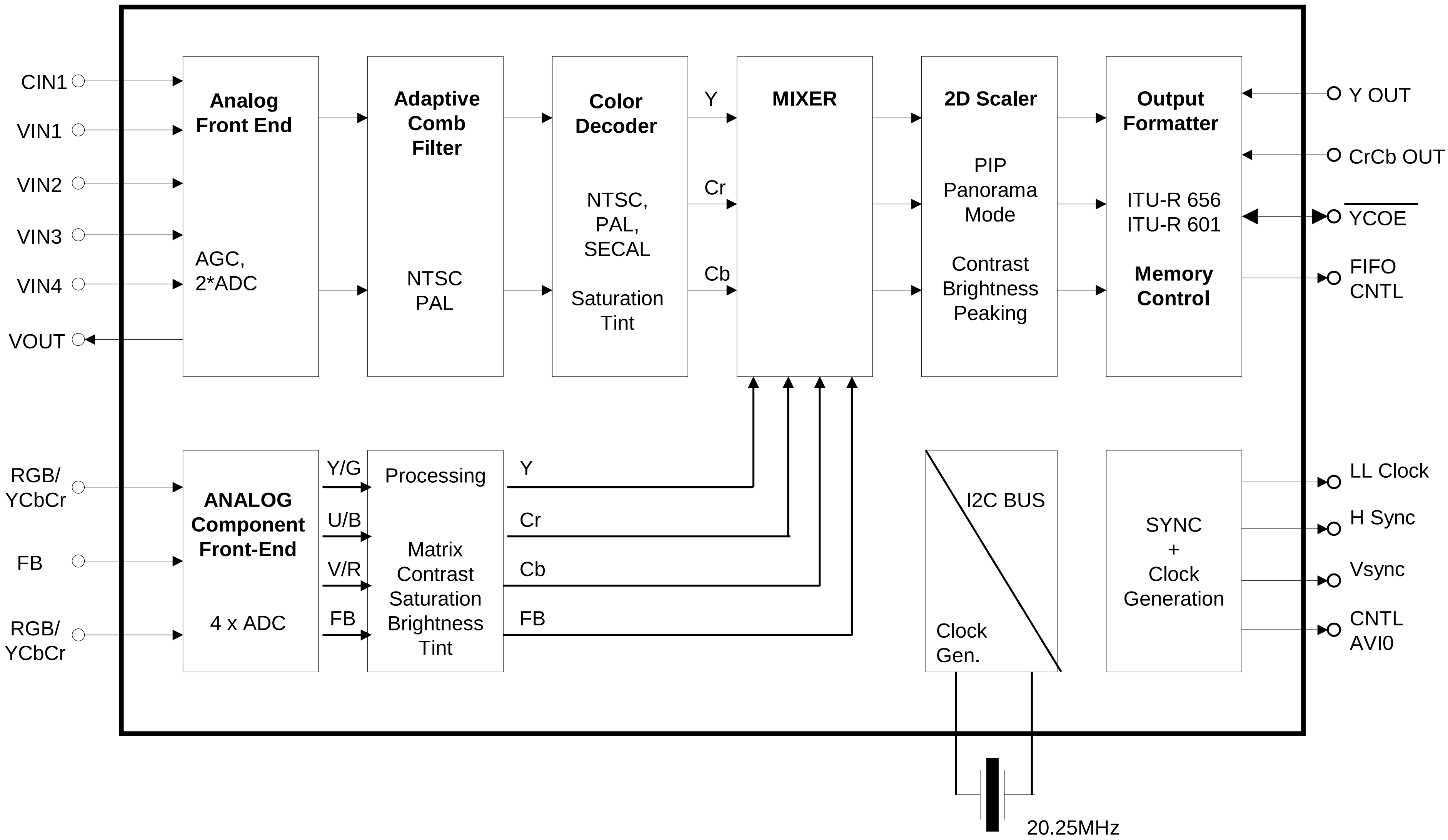
- Programmable RGB matrix
- Digital color bus interface
- Additional analog RGB/Fast blank input
- Half contrast switch
- Picture frame generator

Deflection

- Scan velocity modulation output
- High performance H/V deflection
- Separate ADC for tube measurements
- EHT compensation

Miscellaneous

- One 20.25MHz crystal, few external components
- Embedded RISC controller(80 MIPS)
- I^2C Bus interface
- Single 5V power supply
- Submicrom COMS technology
- 64 pin PSDIP package

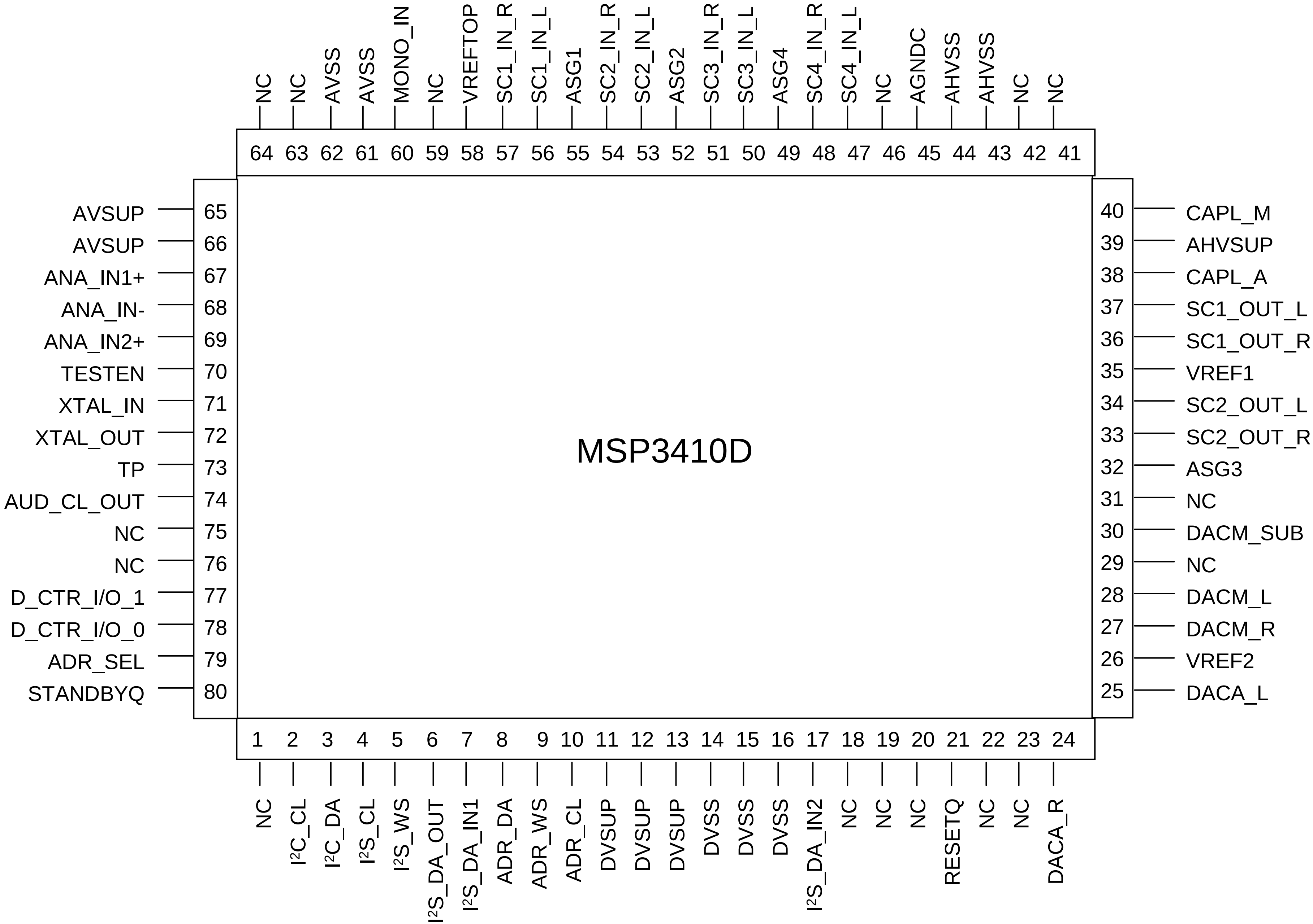

CIN1
VIN1
VIN2
VIN3
VIN4
VOUT
Analog Front End
AGC, 2*ADC
Adaptive Comb Filter
NTSC PAL
Color Decoder
NTSC, PAL, SECAL
Saturation Tint
Y
Cr
Cb
MIXER
2D Scaler
PIP Panorama Mode
Contrast Brightness Peaking
Output Formatter
ITU-R 656 ITU-R 601
Memory Control
Y OUT
CrCb OUT
YCOE
FIFO CNTL
RGB/ YCbCr
FB
RGB/ YCbCr
ANALOG Component Front-End
4 x ADC
Y/G
U/B
V/R
FB
Processing
Matrix Contrast Saturation Brightness Tint
Y
Cr
Cb
FB
I2C BUS
Clock Gen.
SYNC + Clock Generation
LL Clock
H Sync
Vsync
CNTL AVI0
20.25MHz

Pin No.	Pin Name	Type	Connection (if not used)	Short Description
1	B1/CB1IN	IN	VREF	Blue1/Cb1 Analog Component Input
2	G1/Y1IN	IN	VREF	Green1/Y1 Analog Component Input
3	R1/CR1IN	IN	VREF	Red1/Cr1 Analog Component Input
4	B2/CB2IN	IN	VREF	Blue2/Cb2 Analog Component Input
5	G2/Y2IN	IN	VREF	Green2/Y2 Analog Component Input
6	R2/CR2IN	IN	VREF	Red2/Cr2 Analog Component Input
7	ASGF		X	Analog Shield GND F
8	NC	-	LV or GND	No connected
9	V SUPCAP	SUPPLYD	X	Supply Voltage, Digital Decoupling Circuitry
10	V SUPD	SUPPLYD	X	Supply Voltage, Digital Circuitry
11	GND D	SUPPLYD	X	Ground, Digital Circuitry
12	GND CAP	SUPPLYD	X	Ground, Digital Decoupling Circuitry
13	SCL	IN/OUT	X	I 2 C Bus Clock
14	SDA	IN/OUT	X	I 2 C Bus Data
15	RESQ	IN	X	Reset Input, Active Low
16	TEST	IN	GND D	Test Pin, connect to GND D
17	VGAV	IN	GND D	VGAV Input
18	YCOEQ	IN	V SUPD	Y/C Output Enable Input, Active Low
19	FFIE	OUT	LV	FIFO Input Enable
20	FFWE	OUT	LV	FIFO Write Enable
21	FFRSTW	OUT	LV	FIFO Reset Write/Read
22	FFRE	OUT	LV	FIFO Read Enable
23	FFOE	OUT	LV	FIFO Output Enable
24	CLK20	IN/OUT	LV	Main Clock Output 20.25 MHz

Pin No.	Pin Name	Type	Connection (if not used)	Short Description
25	GND PA	SUPPLYD	X	Ground, Pad Decoupling Circuitry
26	V SUPPA	SUPPLYD	X	Supply Voltage, Pad Decoupling Circuitry
27	LLC2	OUT	LV	Double Clock Output
28	LLC1	IN/OUT	LV	Clock Output
29	V SUPLLC	SUPPLYD	X	Supply Voltage, LLC Circuitry
30	GND LLC	SUPPLYD	X	Ground, LLC Circuitry
31	Y7	OUT	GND	Picture Bus Luma (MSB)
32	Y6	OUT	GND	Picture Bus Luma
33	Y5	OUT	GND	Picture Bus Luma
34	Y4	OUT	GND	Picture Bus Luma
35	GND Y	SUPPLYD	X	Ground, Luma Output Circuitry
36	V SUPY	SUPPLYD	X	Supply Voltage, Luma Output Circuitry
37	Y3	OUT	GND	Y Picture Bus Luma
38	Y2	OUT	GND	Y Picture Bus Luma
39	Y1	OUT	GND	Y Picture Bus Luma
40	Y0	OUT	GND	Y Picture Bus Luma(LSB)
41	C7	OUT	GND	Picture Bus Chroma (MSB)
42	C6	OUT	GND	Picture Bus Chroma
43	C5	OUT	GND	Picture Bus Chroma
44	C4	OUT	GND	Picture Bus Chroma
45	V SUPC	SUPPLYD	X	Supply Voltage, Chroma Output Circuitry
46	GND C	SUPPLYD	X	Ground, Chroma Output Circuitry
47	C3	OUT	GND	Picture Bus Chroma
48	C2	OUT	GND	Picture Bus Chroma

Pin No.	Pin Name	Type	Connection (if not used)	Short Description
49	C1	OUT	GND	Picture Bus Chroma
50	C0	OUT	GND	Picture Bus Chroma(LSB)
51	GND SY	SUPPLYD	X	Ground, Sync Pad Circuitry
52	V SUPSY	SUPPLYD	X	Supply Voltage, Sync Pad Circuitry
53	INTLC	OUT	LV	Interlace Output
54	AVO	OUT	LV	Active Video Output
55	FSY/HC	OUT	LV	Front Sync/ Horizontal Clamp Pulse
56	MSY/HS	IN/OUT	LV	Main Sync/Horizontal Sync Pulse
57	VS	OUT	LV	Vertical Sync Pulse
58	FPDAT	IN/OUT	LV	Front-End/ Back-End Data
59	V STBY	SUPPLYA	X	Standby Supply Voltage
60	CLK5	OUT	LV	CCU 5 MHz Clock Output
61	NC	-	LV or GNDd	No connected
62	XTAL1	IN	X	Analog Crystal Input
63	XTAL2	OUT	X	Analog Crystal Output
64	ASGF		X	Analog Shield GND F
65	GND F	SUPPLYA	X	Ground, Analog Front-End
66	VRT	OUT	X	Reference Voltage Top, Analog
67	I2CSEL	IN	X	I 2 C Bus Address Select
68	ISGND	SUPPLYA	X	Signal Ground for Analog Input, connect to GND F
69	V SUPF	SUPPLYA	X	Supply Voltage, Analog Front-End
70	VOUT	OUT	LV	Analog Video Output

Pin No.	Pin Name	Type	Connection (if not used)	Short Description
71	CIN	IN	LV*	Chroma / Analog Video 5 Input
72	VIN1	IN	VRT*	Video 1 Analog Input
73	VIN2	IN	VRT	Video 2 Analog Input
74	VIN3	IN	VRT	Video 3 Analog Input
75	VIN4	IN	VRT	Video 4 Analog Input
76	V SUPAI	SUPPLYA	X	Supply Voltage, Analog Component Inputs Front-End
77	GND AI	SUPPLYA	X	Ground, Analog Component Inputs Front-End
78	VREF	OUT	X	Reference Voltage Top, Analog Component Inputs Front-End
79	FB1IN	IN	VREF	Fast Blank Input
80	AISGND	SUPPLYA	X	Signal Ground for Analog Component Inputs, connect to GND AI


MSP3410D
NC 64
NC 63
AVSS 62
AVSS 61
MONO_IN 60
NC 59
VREFTOP 58
SC1_IN_R 57
SC1_IN_L 56
ASG1 55
SC2_IN_R 54
SC2_IN_L 53
ASG2 52
SC3_IN_R 51
SC3_IN_L 50
ASG4 49
SC4_IN_R 48
SC4_IN_L 47
NC 46
AGNDC 45
AHVSS 44
AHVSS 43
NC 42
NC 41
AVSUP 65
AVSUP 66
ANA_IN1+ 67
ANA_IN- 68
ANA_IN2+ 69
TESTEN 70
XTAL_IN 71
XTAL_OUT 72
TP 73
AUD_CL_OUT 74
NC 75
NC 76
D_CTR_I/O_1 77
D_CTR_I/O_0 78
ADR_SEL 79
STANDBYQ 80
40 CAPL_M
39 AHVSUP
38 CAPL_A
37 SC1_OUT_L
36 SC1_OUT_R
35 VREF1
34 SC2_OUT_L
33 SC2_OUT_R
32 ASG3
31 NC
30 DACM_SUB
29 NC
28 DACM_L
27 DACM_R
26 VREF2
25 DACA_L
1 NC
2 I^{2}C_CL
3 I^{2}C_DA
4 I^{2}S_CL
5 I^{2}S_WS
6 I^{2}S_DA_OUT
7 I^{2}S_DA_IN1
8 ADR_DA
9 ADR_WS
10 ADR_CL
11 DVSUP
12 DVSUP
13 DVSUP
14 DVSS
15 DVSS
16 DVSS
17 I^{2}S_DA_IN2
18 NC
19 NC
20 NC
21 RESETQ
22 NC
23 NC
24 DACA_R

Pin No.	Pin Name	Type	Connection (if not used)	Short Description
1	NC		LV	Not connected
2	I2C_CL	IN/OUT	OBL	I2Cclock
3	I2C_DA	IN/OUT	OBL	I2C data
4	I2S_CL	IN/OUT	LV	I2S clock
5	I2S_WS	IN/OUT	LV	I2S word strobe
6	I2S_DA_O	OUT	LV	I2S data output
7	I2S_DA_IN	IN	LV	I2S1 data input
8	ADR_DA	OUT	LV	ADR data output
9	ADR_WS	OUT	LV	ADR word strobe
10	ADR_CL	SUPPLYD	X	Supply Voltage, Digital Circuitry
11	DVSUP	SUPPLYD	X	Ground, Digital Circuitry
12	DVSUP	SUPPLYD	X	Ground
13	DVSUP	IN/OUT	X	I 2 C Bus Clock
14	DVSS	IN/OUT	X	I 2 C Bus Data
15	DVSS	IN	X	Reset Input, Active Low
16	DVSS	IN	GND D	Test Pin, connect to GND D
17	I2S_DA_IN	IN	GND D	VGAV Input
18	NC	IN	V SUPD	Y/C Output Enable Input, Active Low
19	NC	OUT	LV	FIFO Input Enable
20	NC	OUT	LV	FIFO Write Enable
21	RESET_Q	OUT	LV	FIFO Reset Write/Read
22	NC	OUT	LV	FIFO Read Enable
23	NC	OUT	LV	FIFO Output Enable
24	DACA_R	IN/OUT	LV	Main Clock Output 20.25 MHz
25	DACA_R	SUPPLYD	X	Ground

Pin No.	Pin Name	Type	Connection (if not used)	Short Description
26	V SUPPA	SUPPLYD	X	Supply Voltage
27	LLC2	OUT	LV	Double Clock Output
28	LLC1	IN/OUT	LV	Clock Output
29	V SUPLLC	SUPPLYD	X	Supply Voltage, LLC Circuitry
30	GND LLC	SUPPLYD	X	Ground, LLC Circuitry
31	Y7	OUT	GND	Picture Bus Luma (MSB)
32	Y6	OUT	GND	Picture Bus Luma
33	Y5	OUT	GND	Picture Bus Luma
34	Y4	OUT	GND	Picture Bus Luma
35	GND Y	SUPPLYD	X	Ground, Luma Output Circuitry
36	V SUPY	SUPPLYD	X	Supply Voltage, Luma Output Circuitry
37	Y3	OUT	GND	Y Picture Bus Luma
38	Y2	OUT	GND	Y Picture Bus Luma
39	Y1	OUT	GND	Y Picture Bus Luma
40	Y0	OUT	GND	Y Picture Bus Luma(LSB)
41	C7	OUT	GND	Picture Bus Chroma (MSB)
42	C6	OUT	GND	Picture Bus Chroma
43	C5	OUT	GND	Picture Bus Chroma
44	C4	OUT	GND	Picture Bus Chroma
45	V SUPC	SUPPLYD	X	Supply Voltage, Chroma Output Circuitry
46	GND C	SUPPLYD	X	Ground, Chroma Output Circuitry
47	C3	OUT	GND	Picture Bus Chroma
48	C2	OUT	GND	Picture Bus Chroma
49	C1	OUT	GND	Picture Bus Chroma
50	C0	OUT	GND	Picture Bus Chroma(LSB)

Pin No.	Pin Name	Type	Connection (if not used)	Short Description
51	GND SY	SUPPLYD	X	Ground, Sync Pad Circuitry
52	V SUPSY	SUPPLYD	X	Supply Voltage, Sync Pad Circuitry
53	INTLC	OUT	LV	Interlace Output
54	AVO	OUT	LV	Active Video Output
55	FSY/HC	OUT	LV	Front Sync/ Horizontal Clamp Pulse
56	MSY/HS	IN/OUT	LV	Main Sync/Horizontal Sync Pulse
57	SC1_in_R	IN	LV	SCART 1input,right
58	VREFTOP		OBL	Reference voltage IF A/D converter
59	NC		LV	Not connected
60	MONO_IN	IN	LV	Mono input
61	AVSS		OBL	Analog ground
62	AVSS		OBL	Analog ground
63	NC		LV	Not connected
64	NC		LV	Not connected
65	AVSUP		OBL	Analog power supply 5V
66	AVSUP		OBL	Analog power supply 5V
67	ANA_IN+	IN	LV	IF input 1
68	ANA_IN-	IN	AVSS via 56pF/LV	IF common{can be left vacant,only if IF input1 is also not in use}
69	ANA_IN2+	IN	AVSS via 56pF/LV	IF input{can be left vacant,only if IF input1 is also not in use}
70	TESTEN	IN	OBL	Test pin
71	XTAL_IN	IN	OBL	Crystal oscillator

Pin No.	Pin Name	Type	Connection (if not used)	Short Description
72	XTAL_OUT	OUT	OBL	Crystal oscillator
73	TP		LV	Test pin
74	AUD_CL_(	OUT	LV	Audio clock output(18.432MHz)
75	NC		LV	Not connected
76	NC		LV	Not connected
77	D_CTR_I/(	IN/OUT	LV	D_CTR_I/O_1
78	D_CTR_I/(	IN/OUT	LV	D_CTR_I/O_0
79	ADR_SEL	IN	OBL	I2C Bus address select
80	STANDBY	IN	OBL	Stand-by(low active)

Features

- Converts NTSC/PAL and PC video signal into flat panel display device timing and resolution
- Provide full frame buffer, reduce frame buffer and frame buffer less optional architecture.
- Built-in memory and output clock generator
- Support Auto-tracking and Auto-position capabilities
- Support Auto-gain capability for input image
- On-chip brightness and contrast adjustments
- On-chip gamma correction for panel compensation

Input

- PC video up to 1024X768@85Hz, and 1280X1024 @60Hz operation mode
- Support YCrCb422,RGB888 mode (Interlace & Progressive)
- Support TTL clock input

Output

- Single and dual bit RGB data output
- Built-in YCrCb to RGB color space converter
- Built-in programmable Brightness and Contrast control
- Support Horizontal and Vertical position adjustment

